



DEPARTMENT OF THE ARMY
HEADQUARTERS, I Corps and Fort Lewis
BRAC Environmental Office
Hamilton Army Airfield, Building 86 Annex
Novato, California 94949

June 6, 2001

SUBJECT: Forwarding of the Petroleum Sites Closure Report for East Fort Baker, Final

Mr. Brad Job
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Mr. Job:

The Army is pleased to provide the final draft of the *Petroleum Sites Closure Report, East Fort Baker* for your files. The preceding draft of this document was forwarded to you for review on April 3, 2001. Comments to the draft document were received from the Water Board and the National Park Service. This final includes and incorporates comments as discussed in our May 4, 2001 comment resolution meeting. The comments and responses are included in this final draft of the document.

Site summary spreadsheets for all East Fort Baker Petroleum Sites are also included. The Army is requesting official closure of all petroleum sites at this time.

If you have any questions, please contact me at (415) 883-6386.

Sincerely,

Edward Keller, P.E.
BRAC Environmental Coordinator

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PETROLEUM SITES CLOSURE REPORT

PETROLEUM SITES PROGRAM

East Fort Baker, Marin County, California



FINAL



**U. S. Army Corps
of Engineers**
Sacramento District
Environmental
Design Section



Department of Army
BRAC Environmental Office

June 2001

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Final
Petroleum Sites Closure Report
Petroleum Sites Program
East Fort Baker
Marin County, California
June 2001

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ACRONYMS AND ABBREVIATIONS

AST	Aboveground Storage Tank
bgs	below ground surface
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
DAF	Dilution Attenuation Factor
DHS	Department of Health Services
EBS	Environmental Baseline Survey
ECI	Ecology Control Industries
ECOP	Environmental Condition of Property
EPA	Environmental Protection Agency
FDS	Fuel Distribution System
GGNRA	Golden Gate National Recreation Area
LEL	Lower Explosive Limit
mg/kg	milligram per kilogram
msl	mean sea level
MTBE	Methyl tert butyl ether
NEPA	National Environmental Policy Act
NPS	National Park Service
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated biphenyls
PE	Professional Engineer
PPMD	Programs and Project Management
Presidio	Presidio of San Francisco
RCRA	Resource Conservation and Recovery Act
SI	Site Inspection
STL	Severn Trent Laboratory
TPH	Total Petroleum Hydrocarbons
µg/L	micrograms per liter
USACE	U.S. Army Corps of Engineers
UST	Underground Storage Tank
Water Board	San Francisco Bay Regional Water Quality Control Board

**PETROLEUM SITES
CLOSURE REPORT
PETROLEUM SITES PROGRAM
East Fort Baker, Marin County, California**

1.0 INTRODUCTION

1.1 Scope of Report

This closure report summarizes the actions conducted at petroleum sites on East Fort Baker. The actions include: 1) an aboveground storage tank (AST) removal in conjunction with soil excavation (Building 637 AST); 2) an underground storage tank (UST) removal with subsequent soil removal activities (Building 699 UST); 3) the closure in place of an indoor AST (Building 407 AST), and; 4) the investigation activities conducted at additional petroleum sites located on East Fort Baker. The purpose of the removal activities was to remove the contaminated soil resulting from a leaking pipe at the Building 637 AST site, remove the existing Building 637 AST and remove the existing Building 699 UST which was discovered during a separate removal action at the Engine Repair Shop. The purpose of the closure in place of the Building 407 AST was to drain the inactive tank of its contents, determine if the piping is in good condition by pressure testing, and render it unusable. The purpose of this investigation was to adequately characterize each of the petroleum sites to determine if there is a threat to human health or the environment and to prepare to request closure from the San Francisco Bay Regional Water Quality Control Board (Water Board) for these sites. Activities included subsurface soil, and groundwater sampling, and confirmation sampling for petroleum contaminated excavation sites. The data collected is compared against established action and/or screening levels as developed in the Petroleum Sites Management Plan (USACE 2000b).

1.2 Project Overview

The removal actions and temporary well installations were performed by Geofon, Inc. in accordance with the *Building 637 and 407 Aboveground Storage Tank Removal Work Plan* (Geofon 2000). All sampling was performed by the U.S. Army Corps of Engineers (USACE), Sacramento District in accordance with the *Base Realignment and Closure (BRAC) Site*

Inspection (SI) Work Plan Addendum, Petroleum Sites Program (USACE 2000a). Field work at the Building 637 AST, Building 407 AST, and Building 699 UST sites were conducted from July 31 through November 27, 2000. Investigation activities were conducted in August 2000. The scope of this report includes the field activities and procedures, analytical results of the soil and water samples, and evaluation of analytical results with respect to human health, ecological receptors and water quality, with conclusions and recommendations.

1.3 Regulatory Authority

The Petroleum Sites Program is conducted under the Resource Conservation and Recovery Act (RCRA). The Water Board has been designated the lead regulatory agency for petroleum related activities. The Marin County Office of Waste Management is the lead agency overseeing UST removals. A permit issued from the Marin County office is required to remove a UST and is included in Appendix B for the Building 699 UST removal.

1.4 Site Background

1.4.1 Site Location and Description

East Fort Baker is a U.S. Army installation located in Marin County, California near the northern terminus of the Golden Gate Bridge (Figure 1-1, Site Location Map). The site can be accessed by taking the Sausalito exit off Highway 101, followed by turns onto Dames Drive and Bunker Road. East Fort Baker is a sub-installation of Fort Lewis, Washington, and presently encompasses an area of approximately 93 acres, including 12 acres occupied by Horseshoe Bay. Most of the original East Fort Baker property was previously transferred to become part of the Golden Gate National Recreation Area (GGNRA). The BRAC '95 closure action has designated the remaining 93 acres for transfer to also become part of GGNRA. The dominant features of the BRAC property are a large grassy parade ground surrounded by administrative buildings (Photo 1-1), a small military family housing area, and boating facilities adjacent to Horseshoe Bay (Photo 1-2). The site is situated in a small valley surrounded by steep, grassy slopes and dense groves of eucalyptus trees. Properties adjacent to East Fort Baker include GGNRA to the north and west, a portion of GGNRA and San Francisco Bay to the east, and Horseshoe Bay to the south.



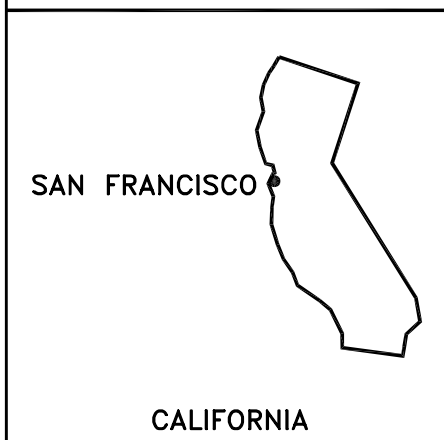
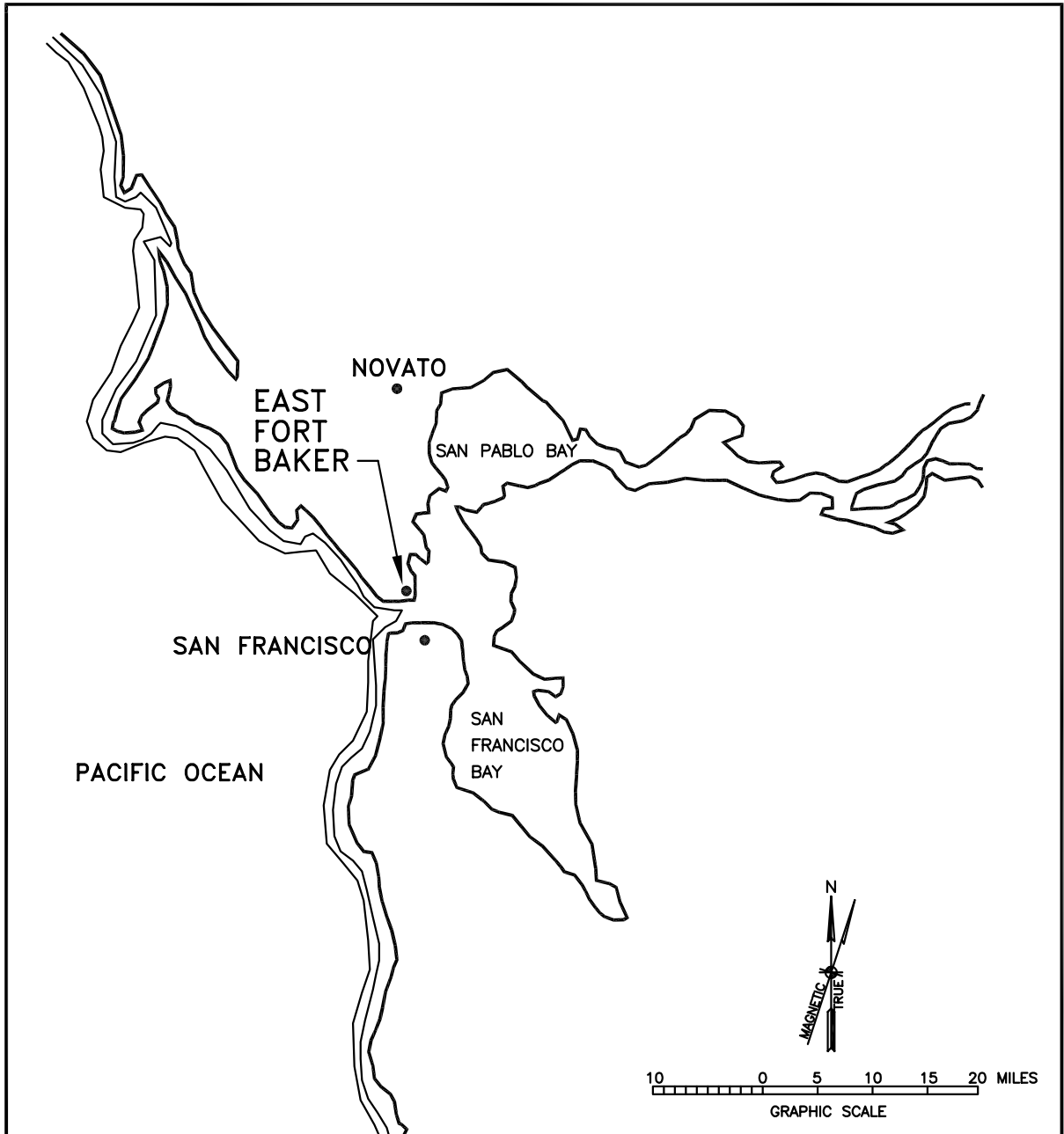
Photo 1-1 East Fort Baker Overview, looking southeast

(Note the parade ground in the center with the flag pole at lower left; Horseshoe Bay on the right; Alcatraz and Treasure Island at top center; downtown San Francisco in the upper right)



Photo 1-2 Horseshoe Bay and Adjacent Facilities, looking from the Vista Point

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DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT,
CORPS OF ENGINEERS
JUNE 2001

EAST FORT BAKER/ MARIN COUNTY,
CALIFORNIA

PETROLEUM SITES PROGRAM CLOSURE REPORT

SITE LOCATION MAP

SCALE:

NOTED

FIGURE:

1-1

1.4.2 Installation History

Fort Baker was originally purchased by the United States from the State of California in 1866 for the purpose of fortifying San Francisco harbor against possible enemy attack from the sea. The original conveyance consisted of approximately 1,900 acres, with an additional 396 acres ceded in 1897. In 1904, the War Department divided Fort Baker and established Fort Barry on the western-most portion of Fort Baker. Construction of a mine depot at Fort Baker began in 1937 and was completed in 1941. During World War II, concrete batteries armed with artillery were replaced by anti-aircraft and anti-submarine batteries. Beginning in 1959, portions of Fort Baker were conveyed back to the State of California. In 1974, Fort Barry and the western portion of Fort Baker were transferred by the Department of the Army to the Department of the Interior, National Park Service (NPS). The remaining acreage of Fort Baker was renamed East Fort Baker. East Fort Baker originally consisted of approximately 545 acres and was retained by the U.S. Army as a sub-installation of the Presidio of San Francisco (Presidio). The Army transferred 452 acres of East Fort Baker to the Department of the Interior in 1986, with the Army retaining the remaining 93 acres. East Fort Baker was made a sub-installation of Fort Lewis upon the closure of the Presidio. The remaining 93 acres of East Fort Baker were slated for disposal under BRAC '95.

1.5 Geologic Setting

East Fort Baker is located within the Coast Ranges physiographic province, which is bounded on the west by the Pacific Ocean and on the east by the Great Valley. The Coast Ranges consist of a series of north-northwest trending sub-parallel ridges ranging from 2,000 to 3,900 feet in elevation above mean sea level (msl).

San Francisco Bay occupies a broad north-trending valley approximately 62 miles in length and 3 to 14 miles in width. The area around the San Francisco Bay is relatively low and divides the province into northern and southern ranges. The Golden Gate Valley is the drowned valley of the ancestral Sacramento River and separates the Marin and San Francisco peninsulas.

1.5.1 Bedrock

The geology of the San Francisco Bay area is very complex. The area is underlain by a thick sequence of metamorphic rocks of the Franciscan Assemblage, which have been folded and faulted. Those rocks are exposed at the surface in some areas, and covered by younger deposits

consisting of alluvium and colluvium in other areas. The area is geologically active, containing young mountains with steep, unstable slopes and large active fault systems.

1.5.2 Soil

The soil of East Fort Baker consists of clays and silts with some sand and gravel, underlain by Franciscan Assemblage bedrock consisting of shale, greenstone, graywacke, chert, and serpentinite. Due to the differential weathering and steep slope of the hills, erosion has exposed the underlying bedrock in surrounding hills.

1.5.3 Hydrogeology

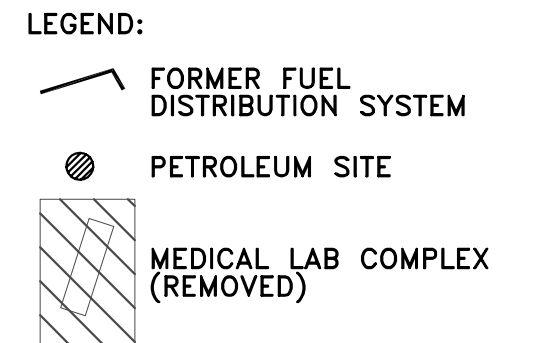
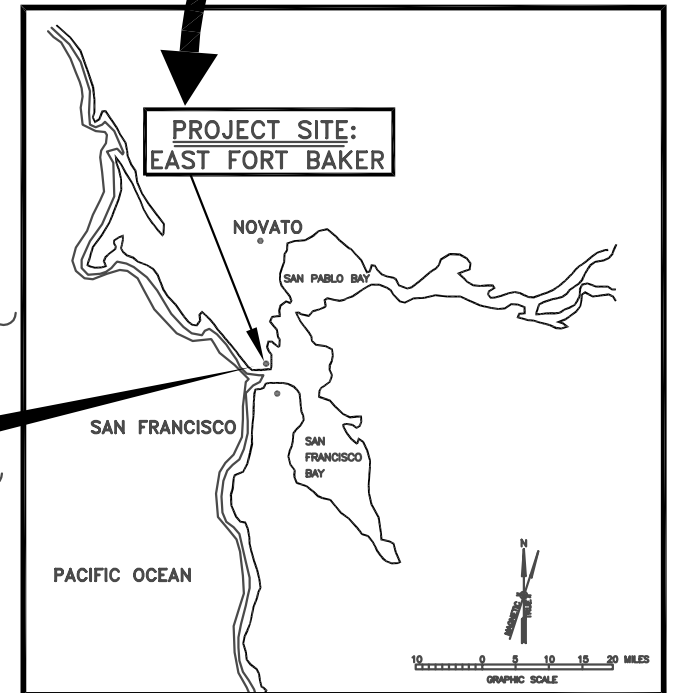
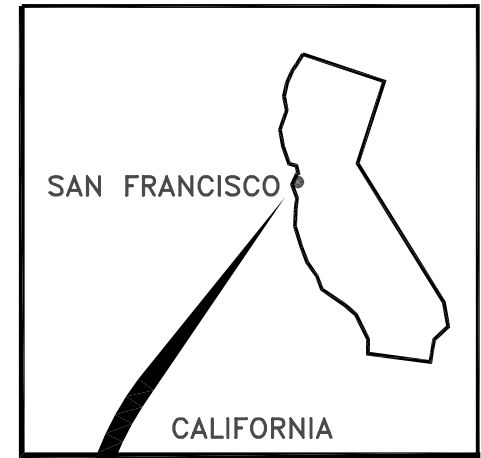
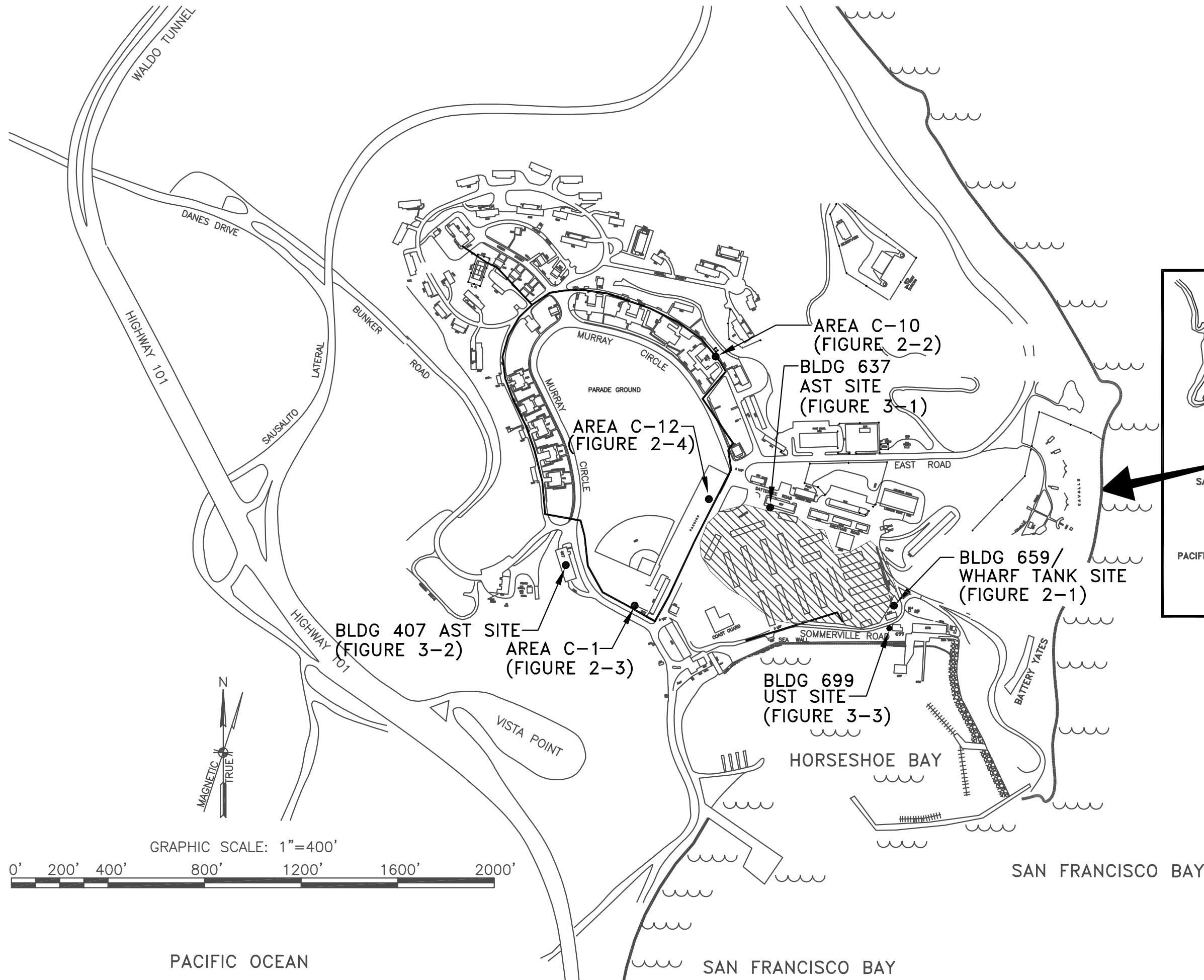
Although the Franciscan rocks vary in composition, they do not function as aquifers at East Fort Baker due to the uniformly low permeability and discontinuity of bedrock fractures. East Fort Baker is mantled with thin soil with abundant rock fragments. Although the groundwater flow direction has not been documented, it is expected to flow with the topography (ESE, 1983) and it is likely southward toward Horseshoe Bay. The groundwater level encountered in a tank excavation near Horseshoe Bay was observed to fluctuate in response to tidal changes (RESNA, 1993). Groundwater was encountered approximately at msl, which ranged from 4 feet to 14 feet below ground surface (bgs) in the areas behind the sea wall. Groundwater has been encountered in the upland areas at a depth of 35 feet bgs.


Horseshoe Bay is the only surface water body at East Fort Baker. Storm water runoff flows into Horseshoe Bay. Due to the basic hydrologic conditions and because East Fort Baker is not in the 100-year flood plain, the installation is not prone to flooding.

1.6 Areas of Concern

The areas of concern that were investigated and/or where remedial actions were conducted are: 1) Main Fuel Distribution System (FDS) Areas, C-1, C-10 and C-12 (collocated with 637 groundwater sample); 2) BRAC property adjacent to the Wharf Tanks (Building 659); 3) Building 637 AST; 4) Building 407 AST and 5) Building 699 UST (Figure 1-2, Site Plan - Petroleum Sites).

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 DEPARTMENT OF THE ARMY SACRAMENTO DISTRICT, CORPS OF ENGINEERS JUNE 2001	
EAST FORT BAKER	MARIN COUNTY, CALIFORNIA
PETROLEUM SITES PROGRAM CLOSURE REPORT	
SITE PLAN-PETROLEUM SITES	
SCALE:	1"=400'
FIGURE:	1-2

The Main FDS was a heating oil source for the buildings along Murray Circle at East Fort Baker. The FDS was broken down into segments during its removal in 1997, named C-1 through C-13, as shown in the Petroleum Sites Management Plan, for the purposes of identifying areas along the line. Area C-1 was chosen to represent the entire fuel line in determining if polynuclear aromatic hydrocarbon (PAH) contamination is a concern along the former fuel line. Area C-10 is a site which had elevated concentrations of fuel oil in the soil. Although the concentrations detected during the previous removal are not of concern in relation to action levels for fuel oil, the contractor noted that the contamination had an odor more of gasoline than fuel oil. Therefore, sampling was conducted to determine if gasoline is present in the soil. The C-12 site also had elevated levels of contamination left in place. Although the soil concentrations are below action levels for the construction/excavation worker, the soil concentrations were greater than the screening level for leaching to groundwater. No groundwater samples had been taken, therefore it was determined that groundwater should be sampled to determine if there was a potential to reach the Bay above screening levels.

The Wharf Tanks were located on a hillside just north of the Yacht Club on NPS lands. These tanks were removed under the Formerly Used Defense Sites program, however elevated concentrations of petroleum hydrocarbons were left in place. No groundwater sampling was conducted during the removal, therefore it was unknown whether the contamination had impacted groundwater.

The Building 637 site contained an active AST that at one time leaked. The concentration of petroleum contamination found in the soil surrounding the AST was greater than action levels, therefore this site required a removal action as well as additional groundwater sampling. This site also required removal and replacement of the existing AST.

The Building 407 indoor AST is associated with a small hydraulic lift. The tank is no longer in use, therefore it was to be drained of its contents, cleaned, pressure tested to determine the integrity of the underground piping and blind flanged so it cannot be used.

The Building 699 UST was found during a separate removal action of the Engine Repair Shop drain line. Following this discovery, the tank was removed.

1.7 Previous Investigations

The Petroleum Sites Management Plan describes all previous investigations conducted at the petroleum sites at East Fort Baker. See Section 3.0 of the Petroleum Sites Management Plan for a discussion of all previous investigations. Because the Building 699 UST was recently discovered, no previous investigations have been conducted at this site.

1.8 Cultural and Environmental Resources

Cultural and environmental resources on the installation, and specifically in the areas of concern, were evaluated by the Environmental Resources Branch, USACE, Sacramento District, in accordance with the National Environmental Policy Act (NEPA), Endangered Species Act, and the National Historic Preservation Act. Clearance for the field work was coordinated through the U.S. Fish and Wildlife Service, Bay Area Air Quality Management District and the State Historic Preservation Officer. An archaeologist was on site for monitoring during any ground disturbing activities.

1.9 Project Objectives

As discussed in the Petroleum Sites Management Plan, certain project wide objectives are common to all petroleum areas of concern at East Fort Baker. These objectives are to:

- Determine if groundwater has been impacted using the screening levels;
- Determine if there is any threat to human health or the environment from soil or groundwater contamination; and
- Identify areas where there is no adverse environmental impact and no further action is required.

For each area of concern, decision criteria were evaluated as developed in the Petroleum Sites Management Plan in consultation with the Army and regulatory agency personnel. The conceptual site models for each site are included in the Petroleum Sites Management Plan.

The Petroleum Sites Management Plan provided guidance for applying a benzo(a)pyrene equivalent for carcinogenic polynuclear aromatic hydrocarbons (PAHs) related to petroleum hydrocarbon contamination. The equivalencies in relation to benzo(a)pyrene are as follows (USACE 2000b):

Benzo(a)pyrene	1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.1
Benzo(a)anthracene	0.1
Chrysene	0.01

For each site in which PAHs were analyzed, a calculation of the benzo(a)pyrene equivalent was done. For any constituent with a non-detect, zero was used. After applying the equivalencies, the sum of the constituents equivalents was calculated and compared to the appropriate benzo(a)pyrene action or screening level for each site. See Appendix I for the benzo(a)pyrene equivalent calculations for each site.

1.10 Project Staffing

This Closure Report was prepared by the Environmental Design Section, Sacramento District, USACE, under the supervision of Richard Meagher, P.E. The project manager is Douglas Delaney of the Programs and Project Management Division (PPMD) and the program manager is Gerald Vincent of PPMD. The technical team for the Petroleum Sites Program consists of:

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Eileen McBride	Senior Environmental Engineer
Leticia Sangalang	Chemist, Synectics
Donna Maxey	Industrial Hygienist
Kathleen Ungvarsky	Field Archaeologist
Josh Garcia	Biologist
Cherie Johnston-Waldear	Archaeologist

Drilling and Removal Services

Geofon, Inc.

Analytical Services

Curtis and Tompkins

Primary Laboratory

Sequoia Analytical

Quality Assurance Laboratory

Severn Trent Laboratory (STL)

Contractor Laboratory

2.0 INVESTIGATION ACTIVITIES AND RESULTS

The investigation of petroleum sites was conducted in accordance with the *BRAC SI Work Plan Addendum, Petroleum Sites Program* (USACE 2000a). All sites were cleared by Underground Services Alert and NPS maintenance personnel prior to intrusive investigation. The *Site Safety and Health Plan* (USACE 2000c) developed for this sampling event was adhered to during all sampling activities.

2.1 Wharf Tanks/Building 659

The two Wharf tanks were located on a hillside just north of the BRAC property line, see Photo 2-1. These tanks were removed in 1996 but not all remaining contamination in the soil was removed. The former 4,000 gallon tanks had four 1,000 gallon chambers each. Only one tank had ever been used. In this tank, two chambers held gasoline and the other two held diesel fuel. The goal of this investigation was to determine if the groundwater had been impacted by the contamination and whether potentially contaminated groundwater was reaching the BRAC property.



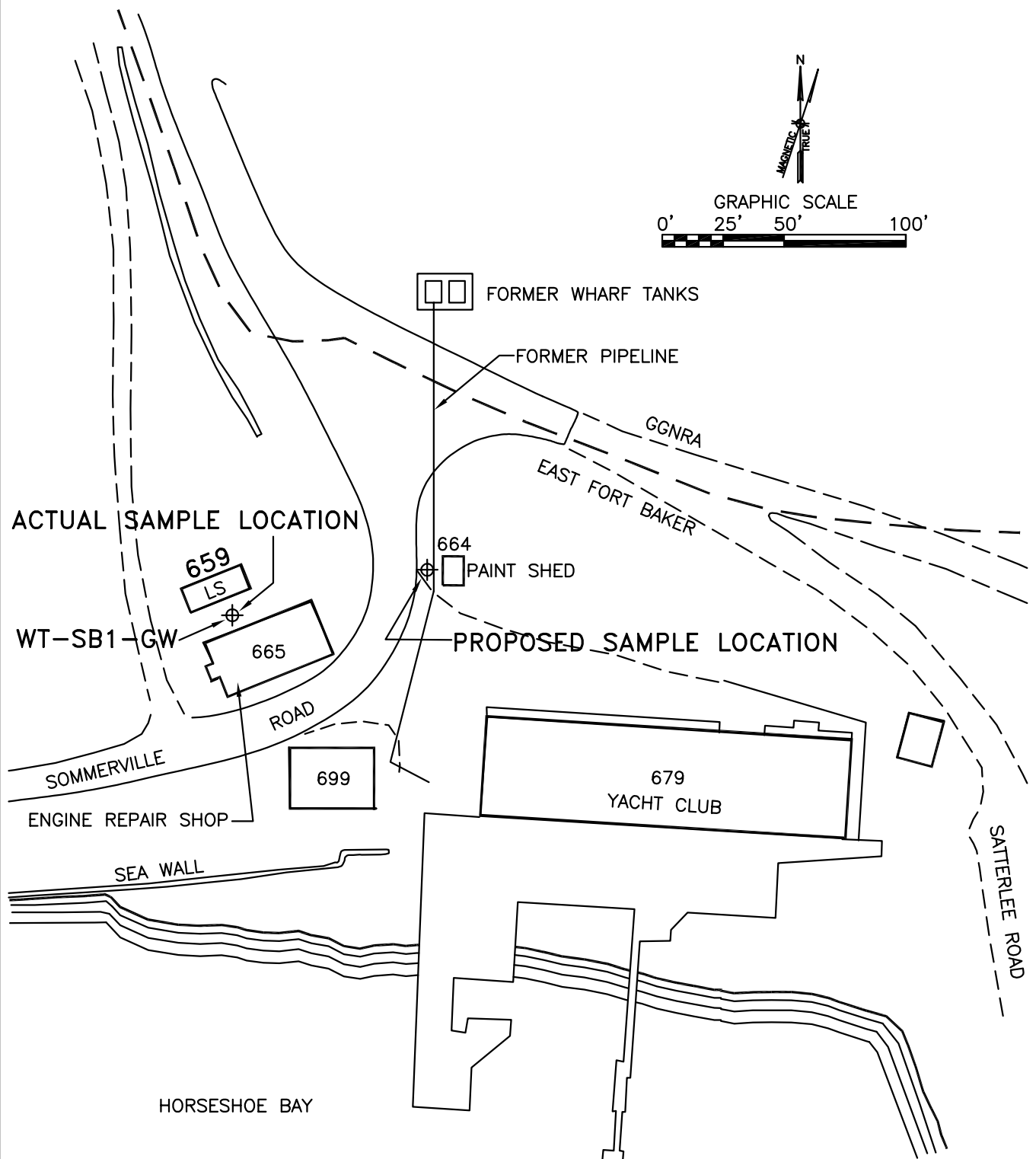
Photo 2-1 Former location of Wharf Tanks

The constituents of concern for this investigation are total petroleum hydrocarbons (TPH) as gasoline and diesel/motor oil, benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tert butyl ether (MTBE), and PAHs.

2.1.1 Investigation Activities

One groundwater sampling location was proposed just east the Paint Shed (Figure 2-1, Wharf Tanks Sampling Location Map). The Contractor began pushing in this area with a Geoprobe® DT54 direct push drill rig set up with a cone penetrometer. The Contractor then pushed to 16 feet bgs when they hit bedrock and bent the rod. Groundwater was not detected at this depth. This location was then abandoned and a new location was chosen down slope.

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The well location (WT-SB1-GW) was relocated across the street between Building 659 and Building 665 (Figure 2-1, Wharf Tanks Sampling Location Map). The ground surface elevation at the new location was approximately 9 feet lower than the proposed location ground surface elevation. This location was chosen based on subsurface petroleum odors identified by maintenance personnel in the past. A Geoprobe[®] was pushed to a depth of 15 feet bgs and the Geoprobe discreet groundwater sampler screen was exposed for 2 feet. The well was left to recharge overnight. Groundwater had leveled to 10 feet bgs by the following day. The contractor also collected cone penetrometer readings at this location, see Appendix D. The soil in these borings consisted of lean clay with gravel.

Sampling was conducted on August 15 & 16, 2000 by USACE. A peristaltic pump was used to obtain the samples. Per the work plan, the first samples collected were BTEX/MTBE to be analyzed by Environmental Protection Agency (EPA) Method 8260 and TPH as gasoline to be analyzed by Department of Health Services (DHS) Method 8015-M, purgeable. The process of collecting VOAs for BTEX and TPH gasoline primary, field duplicate, quality assurance, and matrix spike/matrix spike duplicate samples took two days because of low yield. Therefore, TPH as diesel/motor oil and PAH samples were not collected.

Following sampling, the borehole was backfilled with a bentonite cement mix to about 2 feet bgs and topped with soil.

2.1.2 Evaluation of Results

A table of results with reporting limits and groundwater screening levels are shown in Table 2-1, Analytical Results from Groundwater at the Wharf Tanks Well.

Table 2-1 Analytical Results from Groundwater at the Wharf Tanks Well

Wharf Tanks	Location		SB1
	GW Depth (ft.)		10
Analyte Names	Reporting Limit	Groundwater Screening Level	
EPA Test Method 8260 (all units are ug/L)			
Benzene	0.5	71	nd
Toluene	0.5	5,000	0.1 J
Ethylbenzene	0.5	86	0.07 J
Total Xylenes	0.5	2,200	nd
MTBE	0.5	8,000	nd
EPA Test Method 8310 (all units are ug/L)			
PAHs			NA
DHS Test Method 8015-Modified (all units are ug/L)			
TPH (Gasoline C7 - C12)	50	3,700	nd
TPH (Diesel C10 - C24)		640	NA
TPH (Motor Oil C24 - C36)		640	NA

Legend:

nd = not detected

NA = not analyzed

TPH = Total Petroleum Hydrocarbon

Data Qualifiers:

J = estimated value

Notes:

1. Shaded box indicates that the value exceeds the applicable screening level.
2. Diesel/Motor Oil and PAHs were not sampled because of a lack of yield from the well.

The reporting limits are well below all applicable screening levels. The screening levels are those developed in the Petroleum Sites Management Plan.

BTEX and MTBE were analyzed using EPA Method 8260. MTBE, benzene and total xylenes were not detected in the water sample. Toluene was detected at an estimated value of 0.1 micrograms per liter ($\mu\text{g/L}$) and ethylbenzene was detected at an estimated value of 0.07 $\mu\text{g/L}$.

TPH as gasoline was analyzed using DHS Method 8015-M, purgeable. TPH as gasoline was not detected in the water sample.

No analytes were detected above screening levels. Because of the lack of detections above screening levels for the constituents which are more soluble and mobile, BTEX and gasoline, it is unlikely that there would have been detectable TPH as diesel/motor oil or PAHs in the groundwater.

2.1.3 Conclusions and Recommendations

This site is not located on the BRAC property and no detections above screening levels were found in the groundwater sample, therefore no further action is recommended at this site in relation to the BRAC property. No formal request for closure will be sent to the Water Board for this site since it is on NPS lands. A memo will be sent to the Formerly Used Defense Sites program manager indicating the results of our groundwater sampling event and the recommendation that if groundwater is further investigated, temporary wells be used instead of discreet samplers because of the lack of yield, see Appendix H.

2.2 FDS C-10 Site

The FDS C-10 site is located directly behind Building 636 (Figure 2-2, Area C10 Sampling Location Map). This is an area where the former fuel distribution system piping, which carried heating oil, had leaked. During the FDS removal activities in 1997, this area was overexcavated but halted partially due to utilities and partially due to the belief that the source of contamination may be something other than the FDS. The construction workers indicated that the product smelled more of gasoline than of fuel oil. The goal of this investigation was to determine if gasoline is present at this location.



Photo 2-2 Area C-10 Location, facing Building 505

The constituents of concern here are TPH as gasoline and diesel/motor oil, BTEX, MTBE and lead.

2.2.1 Investigation Activities

Two soil borings were proposed in the roadway at this site. The first soil boring (FDSC10-SB1) was located adjacent to the former excavation. The second boring (FDSC10-SB2) was located adjacent to the retaining wall approximately 10 feet from the former excavation. See Figure 2-2, Area C10 Sampling Location Map, for the locations of these borings.

Both of the sample locations were hand augered due to multiple utilities in the area. While augering FDSC10-SB1, the location had to be moved a couple inches to the west due to piping in the original location. This boring was advanced to a depth of 3 feet bgs when obvious contamination was located. The other boring location was advanced to the original proposed depth of 4-4.5 feet bgs. The soil in these borings consisted of gravelly lean clay.

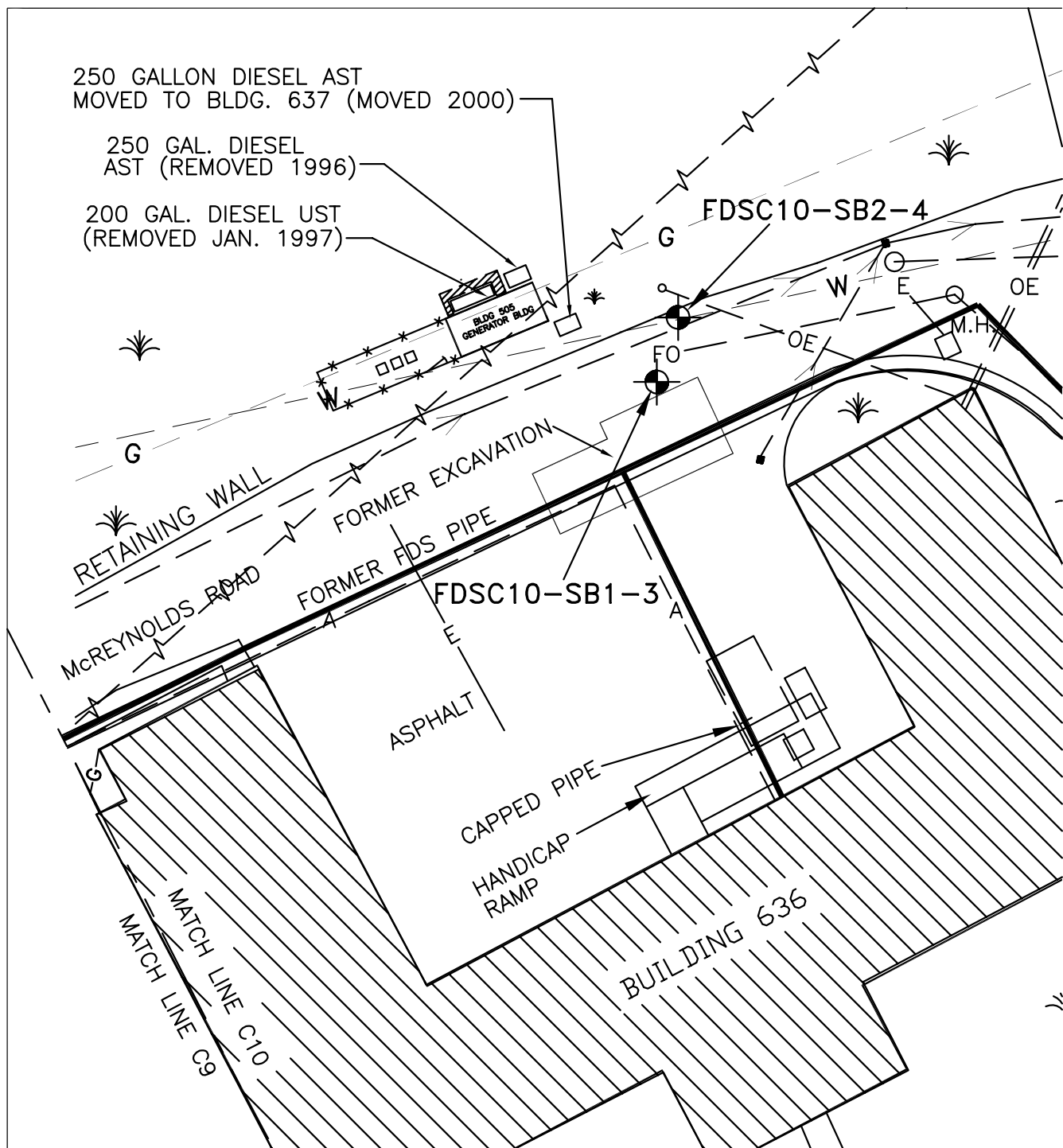
Sampling was conducted on August 16, 2000 by USACE. The primary samples were collected and analyzed for BTEX/MTBE by EPA Method 8260; TPH as gasoline and diesel/motor oil by DHS Method 8015-M, purgeable and extractable, respectively; and lead by EPA Method 6010B. The BTEX/MTBE and gasoline soil samples were collected using Encore™ samplers. TPH as diesel/motor oil samples were collected in 8 oz jars and lead samples were collected in plastic bags. The work plan required the use of glass jars for lead samples, however, the supply was low. The lab was contacted and we were informed that plastic bags were acceptable. Primary, field duplicate, quality assurance, and matrix spike/matrix spike duplicate samples were collected. An equipment blank was collected for lead analysis at this site. The borings were backfilled with soil from the boring locations.

2.2.2 Evaluation of Results

The action levels for this site are as developed in the Petroleum Sites Management Plan. Table 2-2, Summary of Soil Action Levels for the FDS C-10 Site, is included to show how the action levels were chosen. The most restrictive action levels were chosen based on appropriate receptors and depth of contamination.

No potential for leaching to groundwater was evaluated because this site is greater than 500 feet from the mean higher high water line of the Bay and bedrock has been encountered prior to locating groundwater. See Section 2.10, Fractured Bedrock and Contaminant Transport, of the Petroleum Sites Management Plan for a discussion on this rationale. The site is not included in the Sediment Protection Zone, therefore these action levels were not evaluated. The average parcel size of a residence at East Fort Baker, along the former FDS is 110 feet by 120 feet, 0.3 acres. Typical risk assessments use a standard parcel size of 0.25 acres. Therefore, the more conservative, 0.25 acres, has been used throughout this report to determine the residential action level multiplier. The residential action level multiplier of 11.9 was developed based on a contaminated area of 950 square feet, 0.021 acres. A terrestrial receptor action level multiplier of 16.8 was developed based on the 950 square feet of contamination and a 16,000 square foot forage range of the robin. See Section 2.3 of the Petroleum Sites Management Plan for details on the development of the action levels.

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NOTES:

1. SOIL CONTAMINATION WAS DETECTED AT APPROXIMATELY 3FT. BELOW GROUND SURFACE NEAR SB1. THEREFORE, A SOIL SAMPLE WAS COLLECTED FROM 3' BELOW GROUND SURFACE RATHER THAN 4' BELOW GROUND SURFACE.

LEGEND:



SOIL BORING LOCATIONS.

GRAPHIC SCALE: 1" = 20'



DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT,
CORPS OF ENGINEERS
JUNE 2001

EAST FORT BAKER

MARIN COUNTY,
CALIFORNIA

PETROLEUM SITES PROGRAM CLOSURE REPORT

AREA C-10 SAMPLING
LOCATION MAP

SCALE:

1" = 20'

FIGURE:

2-2

Table 2-2 Summary of Soil Action Levels for the FDS C-10 Site

Constituent	Terrestrial Ecological Receptor Soil Action Levels	Recreational Receptor Soil Action Levels	Residential Receptor Soil Action Levels	Construction/Excavation Worker Soil Action Levels	< 3' Action Level	Controlling Receptor	> 3' Action Level	Controlling Receptor
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	<3'	mg/kg	>3'
Gasoline	10,248	2,400	1,030	8,500	1,030	Res	8,500	Constr
Diesel	11,760	3,200	16,422	7,900	3,200	Rec	7,900	Constr
Fuel Oil	16,464	4,500	22,610	7,900	4,500	Rec	7,900	Constr
Benzene	672	1.5	0.62	6.5	0.62	Res	6.5	Constr
Toluene	4,536	1,200	520	670	520	Res	670	Constr
Ethylbenzene	2,100	1,900	230	510	230	Res	510	Constr
Xylenes	924	2,500	210	360	210	Res	360	Constr
Total PAHs (carcinogenic)	-	B(a)Peq (0.1)	B(a)Peq (0.67)	B(a)Peq (2.6)	0.1	Res	2.6	Constr
Total PAHs (non-carcinogenic)	-	1,100	-	92	92	Constr	92	Constr
Benzo(a)pyrene	524.8	0.1	0.67	2.6	0.1	Rec	2.6	Constr
Benzo(b)fluoranthene	-	1	6.66	26	1	Rec	26	Constr
Benzo(k)fluoranthene	-	1	7.26	26	1	Rec	26	Constr
Benzo(a)anthracene	-	1	6.66	26	1	Rec	26	Constr
Chrysene	-	10	72.59	260	10	Rec	260	Constr
Anthracene	-	13,800	166,600	92	92	Constr	92	Constr
Benzo(g,h,i)perylene	-	1,400	7,378	92	92	Constr	92	Constr
Flouranthene	-	1,900	23,800	92	92	Constr	92	Constr
Phenanthrene	-	1,400	7,140	92	92	Constr	92	Constr
Pyrene	-	1,400	17,850	92	92	Constr	92	Constr
Naphthalene	-	1,100	654.5	8.6	8.6	Constr	8.6	Constr
Lead	8,013.6	400	4,760	400	400	Rec	400	Constr
MTBE	-	4,700	4,700	830	830	Constr	830	Constr

Legend:

Rec = Recreational Receptor
 Constr = Construction/Excavation Worker
 Res = Residential Receptor
 B(a)P eq = benzo(a)pyrene equivalent

Notes:

1. The terrestrial receptor multiplier is 16.8, representative of 950 of contaminated area.
2. If the representative parcel size at EFB is 0.25 acres, and the area of contamination in the residential portion is 0.021 acres, then the multiplier would be 11.9.
3. See Section 1.9 for a description of B(a)Peq

The results of this sampling event along with reporting limits and the most restrictive action levels developed as shown above are depicted in Table 2-3, Analytical Results from FDS C-10 Site Investigation.

Table 2-3 Analytical Results from FDS C-10 Site Investigation

FDS Site C-10			Location	SB1	SB2
			Depth (ft.)	3	4
Analyte Names	Reporting Limit	Action Level <3' bgs	Action Level > 3' bgs		
EPA Test Method 8260 (all units are mg/kg)					
Benzene	0.0051 - 0.0059	1.50	6.5	nd	nd
Toluene	0.0051 - 0.0059	432	670	nd	0.0017 J
Ethylbenzene	0.0051 - 0.0059	200	510	0.0043 J	nd
Total Xylenes	0.0051 - 0.0059	88	360	0.016	0.0042 J
MTBE	0.0051 - 0.0059	830	830	nd	nd
DHS Test Method 8015-Modified (all units are mg/kg)					
TPH (Gasoline C7-C12)	0.20 - 0.25	976	8,500	1.9 H,Y	nd
TPH (Diesel C10-C24)	1.1 - 27	1,120	7,900	6800 H	29 Y
TPH (Motor Oil C22-C50)	5.3 - 130	1,120	7,900	5300 L	44 Y
EPA Test Method 6010B (all units are mg/kg)					
Lead	0.16	400	400	nd	87

Legend:

nd = not detected

TPH = Total Petroleum Hydrocarbon

Data Qualifiers:

J = estimated value

Y = fuel unlike standard

H = heavier hydrocarbons contributed to the quantitation

L = lighter hydrocarbons contributed to the quantitation

Notes:

1. Shaded results indicate that the value exceeds the applicable action level.

All reporting limits are below the applicable action levels. The action levels are those developed in the Petroleum Sites Management Plan (USACE 2000b).

BTEX and MTBE were analyzed using EPA Method 8260. MTBE and benzene were not detected in either soil sample. Toluene was detected in sample FDSC10-SB2-4 at an estimated value of 0.0017 milligram per kilogram (mg/kg); ethylbenzene was detected in sample FDSC10-SB1-3 at an estimated value of 0.0043 mg/kg; and total xylenes were detected in samples FDSC10-SB1-3 and FDSC10-SB2-4 at 0.016 mg/kg and estimated at 0.0042 mg/kg, respectively.

TPH as gasoline was analyzed using DHS Method 8015-M, purgeable. TPH as gasoline was detected in soil sample FDSC10-SB1-3 at 1.9 mg/kg for a fuel that did not resemble the

standard pattern and heavier hydrocarbons contributed to the quantitation. TPH as diesel/motor oil was analyzed using DHS Method 8015-M, extractable. TPH as diesel was detected in FDSC10-SB1-3 and FDSC10-SB2-4 at 6,800 mg/kg with heavier hydrocarbons contributing to the quantitation and at 29 mg/kg which did not resemble the diesel standard, respectively. TPH as motor oil was detected in FDSC10-SB1-3 and FDSC10-SB2-4 at 5,300 mg/kg with lighter hydrocarbons contributing to the quantitation and at 44 mg/kg which did not resemble the motor oil standard, respectively.

Lead was analyzed in both soil samples using EPA Method 6010B. Lead was not detected in FDSC10-SB1-3 and was detected at 87 mg/kg in FDSC10-SB2-4.

All analytes are below action levels with the exception of diesel and motor oil in sample FDSC10-SB1-3. These analytes are exceeding the terrestrial receptor action levels. This sampling location was in the roadway behind Building 636. It is therefore, capped with asphalt and not accessible to terrestrial receptors. This roadway is considered historic and will remain a roadway as part of the future plans. The only receptor which is likely to come in contact is the construction/excavation worker. These detections are less than the construction/excavation action level of 7,900 mg/kg.

2.2.3 Conclusions and Recommendations

The site does not contain contamination that is a risk to receptors at the site. The interactive map that will be developed for the Environmental Condition of Property (ECOP) will show the residual contamination remaining. If any future work is done in this area that will change the site conditions, the contamination left in place may need to be examined to determine if there is a risk to human health or the environment.

It is recommended that no further action be taken at this site. A summary spreadsheet is included in Appendix G and a letter will be sent to the Water Board requesting formal closure of the site.

2.3 FDS C-1 Site

The FDS C-1 site is located near Building 691 adjacent to a large eucalyptus tree (Photo 2-2, FDS C-1 Sample Location). This is an area where the former fuel distribution system

pipings, which held fuel oil, had leaked. During the removal activities in 1997, this area was overexcavated but halted due to tree roots impeding further excavation. It was determined that the tree should remain and overexcavation be halted due to these physical limitations. Because of the elevated levels of fuel oil left in place, 18,000 mg/kg, and the ease with which a sample could be obtained, this site was chosen as a representative site for the entire FDS to determine if PAHs are left in place which are of concern to human health or the environment.



Photo 2-3 FDS C-1 Sample Location

The constituents of concern at this site are TPH as diesel/motor oil and PAHs.

2.3.1 Investigation Activities

One sample location was chosen based on the location where fuel oil is remaining in the subsurface. Obvious fuel contamination was located at the 6 foot depth, therefore, the sample was collected and sent to the laboratory for analysis.

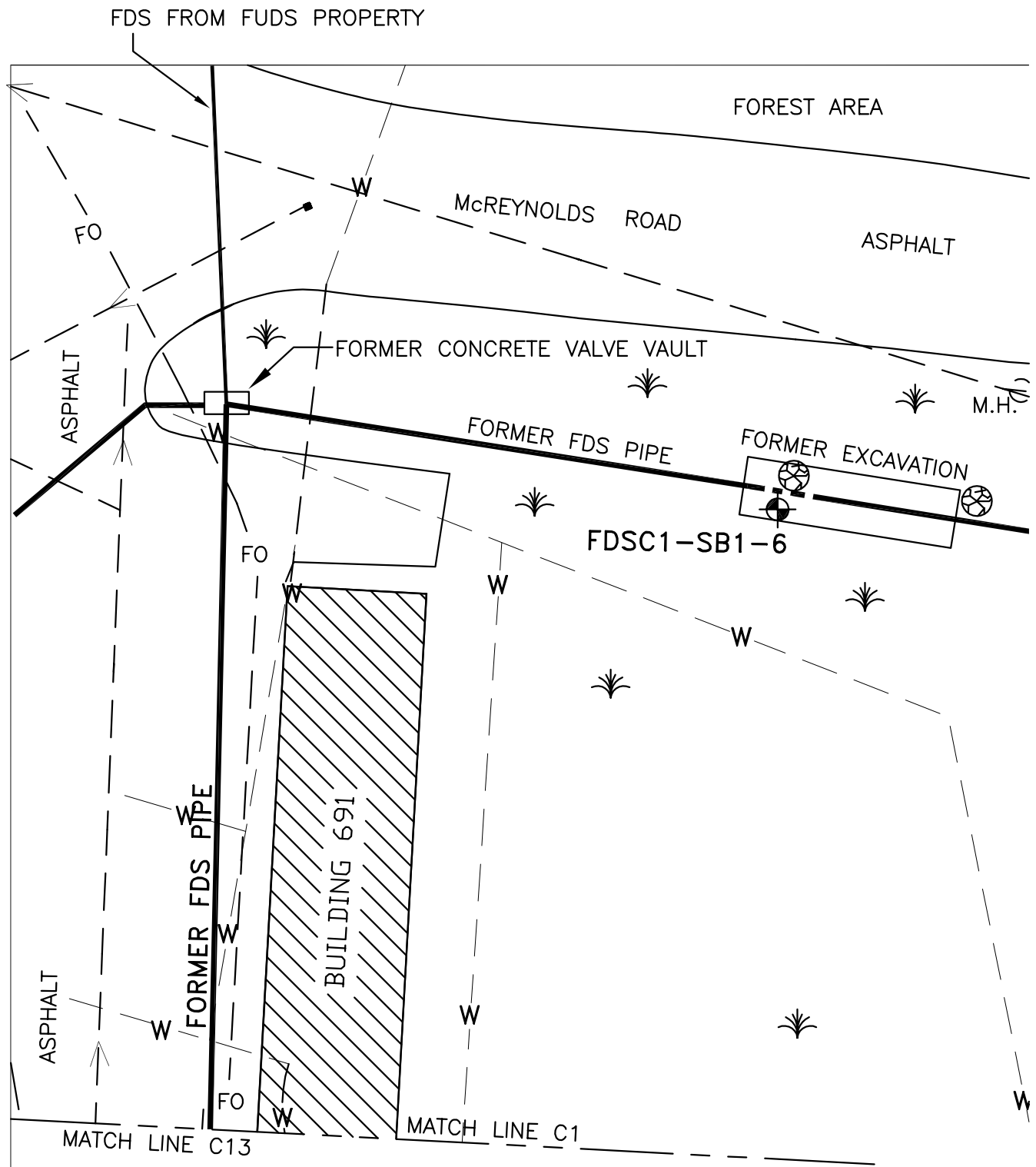
Sampling was conducted on August 9, 2000 by Geofon. The primary sample (FDSC1-SB1-6) was collected by hand augering to 6 feet bgs and collected in a stainless steel sleeve to be analyzed for TPH as diesel/motor oil by DHS Method 8015-M extractable and PAHs by EPA Method 8310. Following sampling activities, soil generated from the boring was placed back in the hole. See Figure 2-3, Area C-1 Sampling Location Map, for the location of sample FDSC1-SB1-6.

2.3.2 Evaluation of Results

The action levels for this site are as developed in the Petroleum Sites Management Plan. Table 2-4, Summary of Soil Action Levels for the FDS C-1 Site, is included to show how the action levels were chosen. The only action levels applicable for this site are those developed for contamination greater than 3 feet bgs. The action levels developed for contamination less than 3 feet bgs are to be used to assess if surface receptors could potentially be threatened due to potential contamination remaining along the remainder of the FDS. The most restrictive action levels are chosen based on appropriate receptors and depth of contamination. A dilution

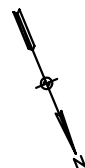
attenuation factor (DAF) of 3 was used as leaching criteria because the closest point on the FDS is approximately 300 feet from the mean higher high water line. If specific locations along the FDS were identified, the screening level for leaching to groundwater would have to be reassessed. The site is not included in the Sediment Protection Zone, therefore these action levels were not evaluated. The assumed area of contamination for any given parcel along the former FDS is 3 feet by 110 feet, 0.008 acres. Three feet was assumed as the width of contamination, while 110 feet is the length of an average parcel along Murray Circle. The 0.008 acres of assumed contamination is used unless there is known contamination of a greater area. The residential action level multiplier of 31.25 was developed based on a contaminated area of 0.008 acres and a 0.25 acre parcel size. A terrestrial receptor action level multiplier of 48.48 was developed based on the same area of contamination and a 16,000 square foot forage range for the robin. See Section 2.3 of the Petroleum Sites Management Plan for details on the development of the action levels.

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LEGEND:

- SOIL BORING LOCATION
- EUCALYPTUS TREES



DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT,
CORPS OF ENGINEERS
JUNE 2001

EAST FORT BAKER

MARIN COUNTY,
CALIFORNIA

PETROLEUM SITES PROGRAM CLOSURE REPORT

AREA C-1 SAMPLING
LOCATION MAP

SCALE:

1" = 20'

FIGURE:

2-3

Table 2-4 Summary of Soil Action Levels for the FDS C-1 Site and Main FDS

Constituent	Terrestrial Ecological Receptor Soil Action Levels	Recreational Receptor Soil Action Levels	Residential Receptor Soil Screening Levels	Construction/ Excavation Worker Soil Action Levels	Soil Screening Levels based on Leaching to Groundwater with Discharge to Marine Receptors	< 3' Action Level	Controlling Receptor	> 3' Action Level	Controlling Receptor
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	<3'	mg/kg	>3'
Gasoline	29,572.80	2,400	1,030.00	8,500	1,887	1,030	Res	1,887	Leach
Diesel	33,936.00	3,200	43,125.00	7,900	1,555.20	1,555.2	Leach	1,555.2	Leach
Fuel Oil	47,510.40	4,500	59,375.00	7,900	1,555.20	1,555.2	Leach	1,555.2	Leach
Benzene	1,939.20	1.5	0.62	6.5	13.75	0.6	Res	6.5	Constr
Toluene	13,089.60	1,200	520.00	670	930	520	Res	670	Constr
Ethylbenzene	6,060.00	1,900	230.00	510	65.44	65.44	Leach	65.44	Leach
Xylenes	2,666.40	2,500	210.00	360	358	210	Res	358	Leach
Total PAHs (carcinogenic)	-	B(a)P eq (0.1)	B(a)P eq (1.75)	B(a)P eq (2.6)	-	0.1	Rec	2.6	Constr
Total PAHs (non-carcinogenic)	-	1,100	-	92	92	92	Constr	92	Constr
Benzo(a)pyrene	1,514.52	0.1	1.75	2.6	0.63	0.10	Rec	0.63	Leach
Benzo(b)fluoranthene	-	1.0	17.50	26	-	1.0	Rec	26	Constr
Benzo(k)fluoranthene	-	1.0	19.06	26	-	1.0	Rec	26	Constr
Benzo(a)anthracene	-	1.0	17.50	26	-	1.0	Rec	26	Constr
Chrysene	-	10	190.63	260	-	10	Rec	260	Constr
Anthracene	-	13,800	437,500.00	92	-	92	Constr	92	Constr
Benzo(g,h,i)perylene	-	1,400	19,375.00	92	-	92	Constr	92	Constr
Flouranthene	-	1,900	62,500.00	92	-	92	Constr	92	Constr
Phenanthrene	-	1,400	18,750.00	92	-	92	Constr	92	Constr
Pyrene	-	1,400	46,875.00	92	-	92	Constr	92	Constr
Naphthalene	-	1,100	1,718.75	8.6	499	8.6	Constr	8.6	Constr
Lead	23,124.96	400	12,500.00	400	-	400	Rec	400	Constr
MTBE	-	4,700	4,700.00	830	2,246.19	830	Constr	830	Constr

Legend:

Rec = Recreational Receptor
 Constr = Construction/Excavation Worker
 Leach = Leaching to Groundwater
 B(a)P eq = benzo(a)pyrene equivalent

Notes:

1. Terrestrial is multiplied by 48.48 (330 sf)
2. If the representative parcel size at EFB is 0.25 acres and the area of contamination in the residential portion is 0.008 acres (3 feet x 110 feet), then the multiplier would be 31.25. 3 feet x 110 feet is based on an estimated width of possible contamination from the pipeline and the width of a parcel.
3. A DAF of 3 was used for the leaching criteria based on the closest site to the bay.
4. See Section 1.9 for a description of B(a)Peq.

Table 2-5, Analytical Results from FDS C-1 Site Investigation, depicts the results from the sampling event at the FDS C-1 site. The table includes detection limits, reporting limits and action levels applicable to this site. There are two sets of action levels applicable to this site. The first is that which is directly applicable to the sample at this location, >3 feet bgs and the other is that which is applicable to a majority of the former FDS around Murray Circle, <3 feet bgs. The comparison for this particular site will be for subsurface receptors only. When using this sample as a representative for the remainder of the FDS, the main receptor will be the most restrictive of the surface soil receptors, residential, terrestrial, recreational, or construction/excavation workers.

Table 2-5 Analytical Results from FDS C-1 Site Investigation

FDS Site C-1				Location	SB1
				Depth (ft.)	6
Analyte Name	Detection Limit	Reporting Limit	Action Level <3' bgs	Action Level > 3' bgs	
EPA Test Method 8310 (all units are mg/kg)					
Naphthalene	2.4	42	8.6	8.6	nd
Acenaphthylene	4.2	84			nd
Acenaphthene	3.4	8.4			nd
Fluorene	0.54	8.4			nd
Phenanthrene	0.32	4.2	92	92	6.6
Anthracene	0.3	4.2	92	92	2.8 J
Fluoranthene	0.58	3.3	92	92	1.2 J
Pyrene	0.22	1.7	92	92	nd
Benzo(a)anthracene	0.32	0.83	1	26	nd
Chrysene	0.26	0.83	10	260	nd
Benzo(b)fluoranthene	0.5	1.7	1	26	1.5 J
Benzo(k)fluoranthene	0.176	0.83	1	26	0.43 J
Benzo(a)pyrene	0.26	0.83	0.1	0.63	nd
Dibenz(a,h)anthracene	0.64	1.7			7.3
Benzo(g,h,i)perylene	1.22	1.7	92	92	1.8
Indeno(1,2,3-cd)pyrene	0.38	0.83			nd
Benzo(a)pyrene equivalent			0.1	2.6	0.193
DHS Test Method 8015-Modified (all units are mg/kg)					
TPH (Diesel C10-C24)		25	1,555	1,555	7,800 H
TPH (Motor Oil C24-C36)		120	1,555	1,555	6,000 L

Legend:

nd = not detected

TPH = Total Petroleum Hydrocarbon

Data Qualifiers:

J = estimated value

H = heavier hydrocarbons contributed to the quantitation

L = lighter hydrocarbons contributed to the quantitation

Notes:

1. Shaded results indicate that the value exceeds the applicable action level.
2. Bold results indicate that the value exceeds the surface action level.
3. The Action and/or screening level for >3' bgs is based on the most restrictive of the construction/excavation worker receptor and the soil screening level for leaching.
4. The Action Level for <3' bgs is based on the most restrictive action levels including residential. Residential does not directly apply to this site, but when using it as a representative site the residential levels were evaluated.
5. No action levels were developed for those constituents with blank spaces in the action level columns.

PAHs were analyzed using EPA Method 8310. The samples had to be diluted 200 times due to the petroleum contamination found in the sample. This caused an increase in detection and reporting limits. Naphthalene, acenaphthylene, acenaphthene, fluorene, pyrene, benzo(a)anthracene, chrysene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene were not detected.

Phenanthrene, anthracene, fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene were detected below action levels. Benzo(b)fluoranthene was detected at an estimated value of 1.5 mg/kg which is above the recreational receptor action level.

TPH as diesel/motor oil was analyzed using DHS Method 8015-M, extractable. Diesel was detected at 7,800 mg/kg in which heavier hydrocarbons contributed to the quantitation. Motor oil was detected at 6,000 mg/kg in which lighter hydrocarbons contributed to the quantitation.

When comparing the results for this site against the subsurface action levels, construction/excavation worker or leaching to groundwater, there are no PAHs which exceed action levels. The benzo(a)pyrene equivalent is 0.193 mg/kg. This does not exceed the subsurface action level of 2.6 mg/kg. The Diesel/Motor Oil actions levels are exceeded for this site. However, as was true during the original excavation, this site has physical limitations which preclude any further excavation.

When comparing the results for this site against the surface action levels, recreational, residential, terrestrial, construction/excavation worker or leaching, only one PAH, benzo(b)fluoranthene, is above surface action levels. The benzo(a)pyrene detection limit exceeded the action level due to having to dilute the sample 200 times because of fuel oil contamination. The benzo(a)pyrene equivalent, 0.193 mg/kg, does exceed the surface action level of 0.1 mg/kg.

2.3.3 Conclusions and Recommendations

Only diesel/motor oil exceeded the subsurface action levels. No further action is recommended at this site due to the physical constraints of excavating any further. The interactive map that will be developed for the ECOP will show the residual contamination remaining.

Even with the elevated levels of fuel oil in the subsurface, the only PAH that exceeded action levels for surface receptors was benzo(b)fluoranthene. The C-1 site is 6 feet bgs and the benzo(a)pyrene equivalent is below the action level of 2.6 mg/kg. However, if using this as a representative site for the FDS, the B(a)P_{eq} for the surface receptor is above the action level, 0.1

mg/kg. This site was chosen based on the elevated concentration of fuel oil left in place, 7,800 mg/kg as diesel. With the exception of site C-10, the remainder of the FDS has significantly lower petroleum detections. The next highest surface petroleum detection along the FDS is 380 mg/kg. The PAHs that may be present in soil in association with these low levels of petroleum are likely much lower in concentration than those detected in sample C-1. It is unlikely that the PAHs would exceed action levels along the remainder of the FDS. The interactive map that will be developed for the ECOP will show the residual contamination remaining. Construction workers should be made aware of the potential petroleum contamination in the area.

2.4 FDS C-12 Site

The FDS C-12 site is located in the parking lot across the street from the Bay Area Discovery Museum, (Figure 2-4, Building 637 and Area C-12 Sampling Location Map). This is an area where the former fuel distribution system piping, which held heating oil, had leaked. During the removal activities in 1997, this area was overexcavated but halted due to concerns over blocking traffic into the museum parking lot. Because of the elevated levels of fuel oil left in place, 3,900 mg/kg, it was determined that a groundwater sample should be taken to determine if groundwater has been impacted.

The constituents of concern at this site are TPH as diesel/motor oil and PAHs.

2.4.1 Investigation Activities

The Water Board agreed that the groundwater sampling point placed to determine if the Building 637 AST had impacted groundwater would also serve as the location to determine if the FDS C-12 Site had impacted groundwater.

One discreet groundwater sampling location (AST637-SB5) was chosen based on assumed groundwater flow direction, (Figure 2-4, Building 637 and Area C-12 Sampling Location Map). Geofon pushed the Geoprobe discreet groundwater sampler to a depth of 13 feet bgs. The screen was exposed for 2 feet. Groundwater was allowed to recharge overnight. Groundwater was measured at 5.7 feet bgs. Samples were then collected and analyzed for TPH as diesel/motor oil by EPA Method 8015-M extractable and PAHs by EPA Method 8310. The

samples were collected in 1 liter amber containers using a peristaltic pump. This well had a low yield, but all samples were collected over an 8 hour time period.

2.4.2 Evaluation of Results

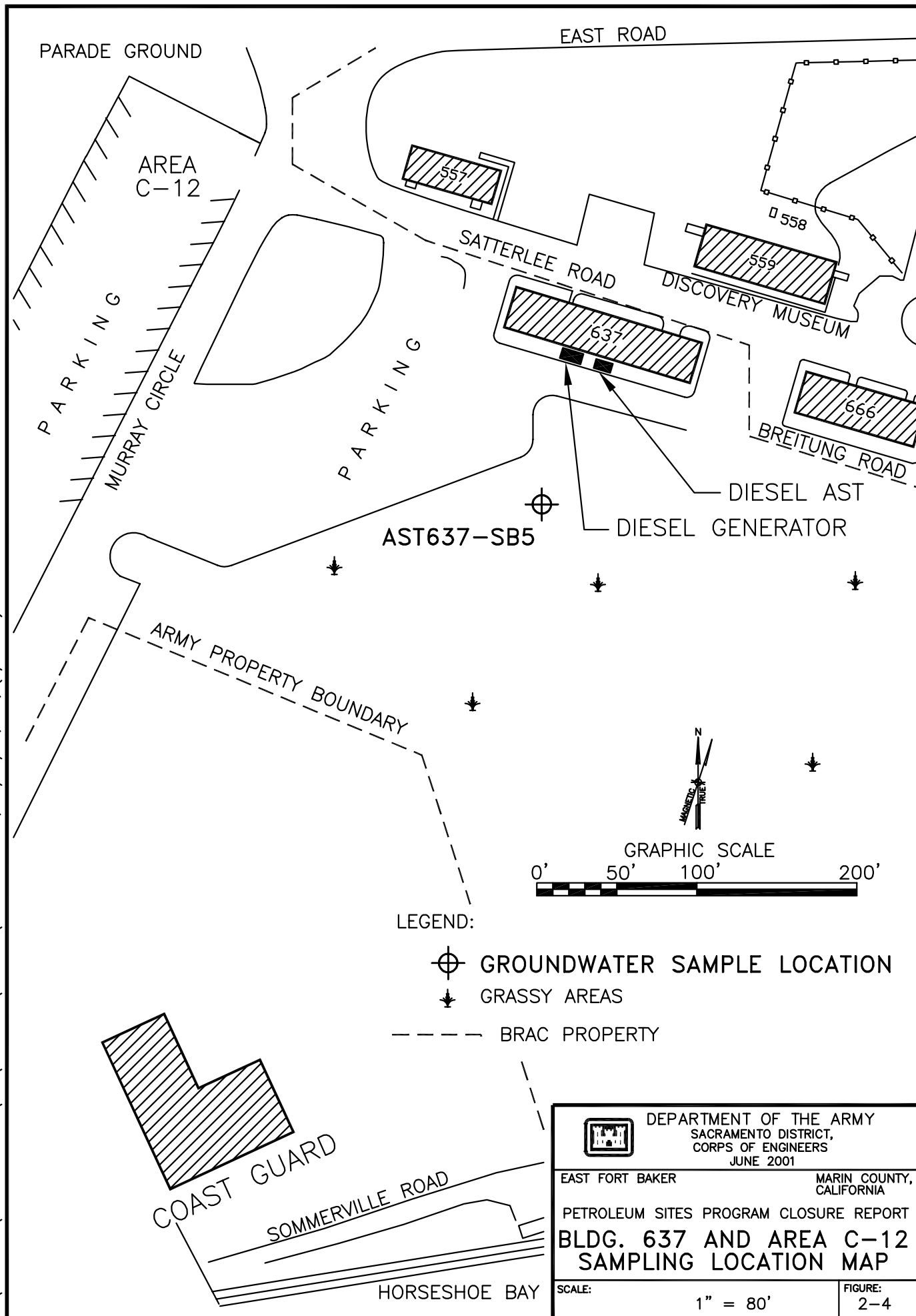
The sample results for the FDS C-12 groundwater sampling location (AST637-SB5) are included in Table 3-3, Analytical Results from AST 637 Water Sampling. No PAHs were detected in the temporary well. Diesel and motor oil were not detected in the temporary well. No constituents were detected in the down gradient sampling point. This indicates that the contamination is not migrating. Based on the lack of detections in the groundwater at the sampling point, no further action is recommended in association with groundwater at this site.

2.4.3 Conclusions and Recommendations

The site does not contain contamination that is a risk to receptors at the site. This area is very small. The interactive map that will be developed for the ECOP will show the residual contamination remaining. If any future work is done in this area on the building or utilities, the construction worker should be notified of the remaining contamination.

It is recommended that no further action be taken at this site. A summary spreadsheet is included in Appendix G and a letter will be sent to the Water Board requesting formal closure of the site.

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3.0 REMOVAL ACTIVITIES AND RESULTS

All removal activities were conducted according to the *Building 637 and 407 Aboveground Storage Tank Removal Work Plan* (Geofon 2000). All confirmation sampling activities were conducted according to the *BRAC SI Work Plan Addendum, Petroleum Sites Program* (USACE 2000a). Construction activities began on July 31, 2000 and were completed on November 27, 2000.

3.1 Building 637 AST Site

A 275-gallon diesel AST was located approximately 5 feet south of Building 637, the telephone exchange building. The AST supplied diesel fuel to an emergency electrical generator. The generator is being used by the NPS as a backup for their telephone system. The generator and/or the pipeline from the AST to the generator was reported in the Environmental Baseline Survey (EBS) to have leaked fuel onto the ground (W-C, 1997). The pipeline was subsequently repaired and a concrete secondary containment was constructed around the AST. Stained soil was still visible on the ground surface between the building, the AST, and the generator. The surface drainage slopes away from the parking area and towards Building 637.



Photo 3-1 Building 637 Following Remediation

3.1.1 Removal Activities

On July 31, 2000 work began at the Building 637 AST site. Geofon drained the 250 gallon AST located near Building 505 and moved it to the fenced area near Building 637. This is the replacement tank for the standby generator. Geofon then drained, rinsed and inerted the existing 275 gallon Building 637 AST. Approximately 10 gallons of rinsate were collected from the AST after rinsing using high pressure/low volume methods. Geofon used 20 lbs of dry ice to inert the tank. The oxygen and lower explosive limit (LEL) readings were 0% after inerting the tank. The generator was disconnected and stored in the fenced area temporarily while the excavation activities were conducted. Ecology Control Industries (ECI), Geofon's

subcontractor, then labeled the tank (28449) and transported it off site to their recycling facility under proper manifesting requirements, see Appendix B. Following removal of the AST, the secondary containment and generator pad were then demolished and disposed of at Redwood Landfill in Novato, California.

Following this preliminary work, the excavation to remove the contaminated soil began. The excavation was started near the south east corner of the manhole in this area (Figure 3-1, Building 637 Excavation). This location was chosen because the contamination was apparent from the surface. At a depth of approximately 4 feet bgs it was apparent that the petroleum contamination spread laterally. The excavation was then extended in all directions. Groundwater was encountered at approximately 4.5 feet bgs. Many utilities were encountered in the area including a sewer line adjacent to the building, a storm line just to the south of the manhole running parallel with the building, a water line, a concrete encased electrical line, a gas line and the electrical conduit from the generator to the building (Figure 3-1, Building 637 Excavation). These utilities created many areas which were difficult to excavate. The Contractor excavated to a maximum depth of 7 feet bgs. Soil from the excavation was temporarily stored on plastic sheeting and then transferred to a storage bin at the end of every work day. When necessary, groundwater was pumped out of the excavation into a 5,000 gallon Baker™ tank.

Approximately 40 tons of soil were excavated at this location. The soil was transported by ECI and disposed of at B&J landfill in Vacaville, CA. Approximately 550 gallons of water were pumped from the excavation. Water generated from pumping the excavation was transported by ECI and disposed of at Evergreen Oil, Inc. facility in Newark, CA.

The one area which was contaminated but would have been extremely difficult to excavate was directly adjacent to the building, just east of the excavation near the manhole. The excavation was not extended into this area, however, a sidewall soil sample was collected to determine the level of contamination remaining. All remaining contamination in this area is greater than 3 feet bgs.

The excavation was then backfilled with similar material obtained from American Soil Products. The excavation was backfilled in 8 inch lifts and compacted using a wacker rammer.

The soil around the utilities was compacted using a hoe-pack and final compaction was completed using a walk-behind Sheepsfoot roller. Topsoil was placed on the top 6 inches.

After backfilling the excavation, a concrete pad was laid for the generator. The concrete was left to cure for 7 days following placement. The generator was then replaced to its original position. The AST that had been moved from the Building 505 area was relocated next to the generator. NPS maintenance personnel then reconnected the AST and the generator.

3.1.2 Confirmation Sampling Activities

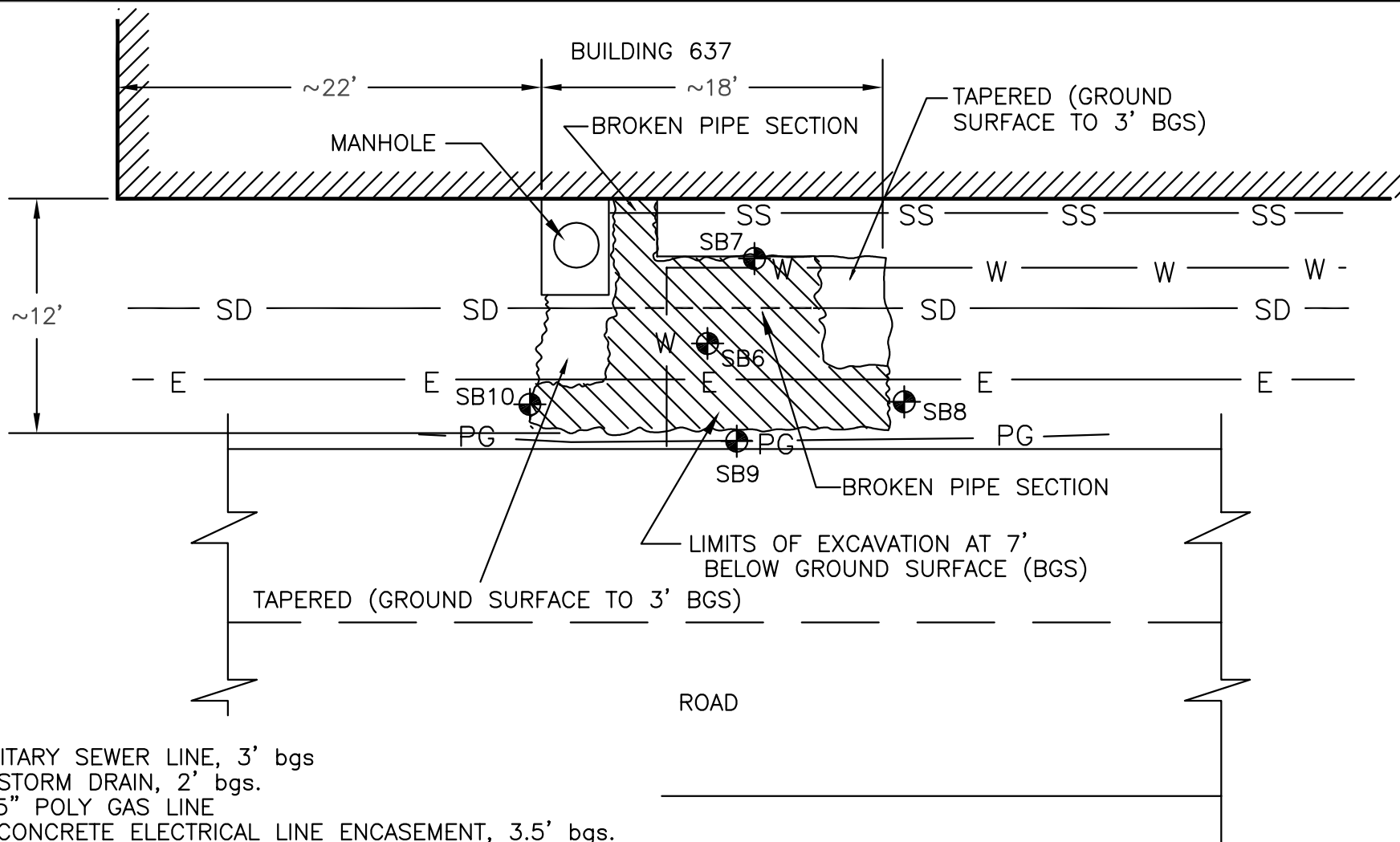
After excavating to the extent which was expected to meet cleanup criteria, with the exception of the area described above, five (5) soil confirmation samples were collected. One sample was collected from the bottom of the excavation and four sidewall samples were collected. Each sample was analyzed for TPH as diesel/motor oil by DHS Method 8015-M extractable and PAHs by EPA Method 8310. The samples were collected from the backhoe bucket using a stainless steel spoon and glass jars. Primary samples, field duplicates, quality assurance, matrix spike/matrix spike duplicates, and equipment blanks were collected. One water sample was also collected from the standing water in the excavation. Samples were collected using a peristaltic pump. This sample was analyzed for BTEX by EPA Method 8260, TPH as diesel/motor oil by DHS Method 8015-M, extractable and PAHs by EPA Method 8310.

One discreet groundwater sampling location (AST637-SB5) was chosen based on assumed groundwater flow direction, (Figure 2-4, Bldg. 637 and Area C-12 Sampling Location Map). Geofon pushed the Geoprobe discreet groundwater sampler to a depth of 13 feet bgs. The screen was exposed for 2 feet. Groundwater was allowed to recharge overnight. Groundwater was measured at 5.7 feet bgs. Samples were then collected and analyzed for TPH as diesel/motor oil by EPA Method 8015-M extractable and PAHs by EPA Method 8310. The samples were collected in 1 liter amber containers using a peristaltic pump. This well had a low yield, but all samples were collected over an 8 hour time period.

3.1.3 Evaluation of Results

The action levels for this site are as developed in the Petroleum Sites Management Plan. Table 3-1, Summary of Soil Action Levels for the AST 637 Site, is included to show how the action levels were chosen. The only action levels applicable for this site are those developed for

contamination greater than 3 feet bgs, construction/excavation worker and leaching to groundwater, because all surface contamination has been removed. The most restrictive action levels are chosen based on appropriate receptors and depth of contamination. A DAF of 5 was used as leaching criteria because the closest point to the AST 637 site from the mean higher high water line is approximately 550 feet. The site is not located in a residential area or in the Sediment Protection Zone, therefore these action levels were not evaluated. Terrestrial receptor action levels were not evaluated because all of the remaining contamination is greater than 3 feet bgs. See Section 2.3 of the Petroleum Sites Management Plan for details on the development of the action levels.



LEGEND:

- SS SANITARY SEWER LINE, 3' bgs
- SD 8" STORM DRAIN, 2' bgs.
- PG 1.75" POLY GAS LINE
- E 6" CONCRETE ELECTRICAL LINE ENCASEMENT, 3.5' bgs.
- W 2" WATER LINE, 1' bgs.
- ⊙ SOIL SAMPLE

NOTES:

SB6 IS A BOTTOM SAMPLE, THE REMAINDER ARE SIDE WALL SAMPLES.



DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT,
CORPS OF ENGINEERS
JUNE 2001

EAST FORT BAKER

MARIN COUNTY,
CALIFORNIA

PETROLEUM SITES PROGRAM
CLOSURE REPORT

BUILDING 637 EXCAVATION

SCALE:

1" = 8'

FIGURE:

3-1

Table 3-1 Summary of Soil Action Levels for at AST 637 Site

Constituent	Construction/ Excavation Worker Soil Action Levels	Soil Screening Levels based on Leaching to Groundwater with Discharge to Marine Receptors	> 3' Action Level	Controlling Receptor
	mg/kg	mg/kg	mg/kg	>3'
Gasoline	8,500	3,145	3,145	Leach
Diesel	7,900	2,592	2,592	Leach
Fuel Oil	7,900	2,592	2,592	Leach
Benzene	6.5	29.13	6.5	Constr
Toluene	670	930	670	Constr
Ethylbenzene	510	138.66	138.66	Leach
Xylenes	360	358	358	Leach
Total PAHs (carcinogenic)	B(a)P eq (2.6)	-	2.6	Constr
carcinogenic)	92	92	92	Constr
Benzo(a)pyrene	2.6	1.35	1.35	Leach
Benzo(b)fluoranthene	26	-	26	Constr
Benzo(k)fluoranthene	26	-	26	Constr
Benzo(a)anthracene	26	-	26	Constr
Chrysene	260	-	260	Constr
Anthracene	92	-	92	Constr
Benzo(g,h,i)perylene	92	-	92	Constr
Flouranthene	92	-	92	Constr
Phenanthrene	92	-	92	Constr
Pyrene	92	-	92	Constr
Naphthalene	8.6	499	8.6	Constr
Lead	400	-	400	Constr
MTBE	830	4,759.53	830	Constr

Notes:

1. A DAF of 5 was used based on the distance to the mean higher high water line of 550 feet.
2. Action levels for surface receptors were not evaluated because surface contamination has been remediated.
3. See Section 1.9 for a description of B(a)P eq.

Legend:

Constr = Construction/Excavation Worker

Leach = Leaching to Groundwater

B(a)P eq = benzo(a)pyrene equivalent

The results of the soil confirmation sampling are compiled in Table 3-2, Analytical Results from AST 637 Soil Confirmation Sampling. The results of the surface water and discrete groundwater sampling location are compiled in Table 3-3, Analytical Results from AST 637 Water Sampling.

Table 3-2 Analytical Results from AST 637 Soil Confirmation Sampling

AST 637		Location	SB6	SB7	SB8	SB9	SB10
		Depth (ft.)	6'10"	4	6.5	6	6
Analyte Names	Reporting Limit	Action Level > 3' bgs					
EPA Test Method 8310 (soil units are mg/kg)							
Naphthalene	0.22 - 9.3	8.6	0.21 J	nd	0.12 J	nd	nd
Acenaphthylene	0.44 - 19		nd	nd	nd	nd	nd
Acenaphthene	0.044 - 1.9		nd	nd	nd	nd	nd
Fluorene	0.044 - 1.9		0.087	nd	nd	nd	nd
Phenanthrene	0.022 - 0.93	92	0.15	4.9	0.039 J	0.86	nd
Anthracene	0.022 - 0.93	92	nd	nd	nd	nd	nd
Fluoranthene	0.017 - 0.74	92	0.033	nd	0.032 J	nd	nd
Pyrene	0.0088 - 0.38	92	0.021	0.65	0.05	0.071 J	nd
Benzo(a)anthracene	0.0043 - 0.19	13.5	0.023	0.54	nd	0.032 J	nd
Chrysene	0.0043 - 0.19	135	0.16	3.5	0.044	0.19	0.067
Benzo(b)fluoranthene	0.0088 - 0.38	13.5	nd	nd	0.041 J	0.38	0.1 J
Benzo(k)fluoranthene	0.0043 - 0.19	13.5	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.0043 - 0.19	1.35	nd	nd	0.044	nd	nd
Dibenz(a,h)anthracene	0.0088 - 0.38		nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.0088 - 0.38	92	nd	nd	nd	nd	nd
Indeno(1,2,3-cd)pyrene	0.0043 - 0.19		nd	nd	nd	nd	nd
Benzo(a)pyrene equivalent		2.6	0.0039	0.089	0.049	0.043	0.011
DHS Test Method 8015-Modified (soil units are mg/Kg)							
TPH (Diesel C10-C24)	1.2 - 220	2,592	2,100	18,000	56	490	69
TPH (Motor Oil C24-C36)	5.8 - 1100	2,592	nd	nd	39 H	60 Y	160 H

Legend:

nd = not detected

TPH = Total Petroleum Hydrocarbon

Data Qualifiers:

J = estimated value

Y = fuel unlike the standard

H = heavier hydrocarbons contributed to the quantitation

Notes:

1. Shaded result indicates that the value exceeds the applicable action level.
2. Blank box in the action level column indicates no action level has been developed.

PAH soil samples were analyzed using EPA Method 8310. Phenanthrene, pyrene, benzo(a)anthracene and chrysene were detected in most samples at low concentrations. Naphthalene, fluorene, fluoranthene, benzo(b)fluoranthene and benzo(a)pyrene were detected in some samples at low concentrations. Acenaphthylene, acenaphthene, anthracene, benzo(k)fluoranthene, dibenz(a,h)anthracene, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene were not detected in any sample. The benzo(a)pyrene equivalent for samples SB6, SB7, SB8,

SB9 and SB10 are 0.0039 mg/kg, 0.089 mg/kg, 0.049 mg/kg, 0.043 mg/kg and 0.011 mg/kg, respectively. These are all below the benzo(a)pyrene equivalent of 2.6 mg/kg for a construction/excavation worker.

Diesel/motor oil samples were analyzed using DHS Method 8015-M extractable. Diesel was detected in samples SB6 (2,100 mg/kg), SB8 (56 mg/kg), SB9 (490 mg/kg) and SB10 (69 mg/kg) below action levels. Diesel was detected at 18,000 mg/kg in sample SB7. Motor oil was detected in sample SB9 (60 mg/kg) as a fuel unlike the standard. Motor oil was detected in samples SB8 (39 mg/kg) and SB10 (160 mg/kg) with heavier hydrocarbons contributing to the quantitation. Motor oil was not detected in samples SB6 and SB7.

Table 3-3 Analytical Results from AST 637 Water Sampling

AST 637	Location		Surface Water	SB5
	GW Depth (ft.)		4.5	5.7
Analyte Names	Reporting Limit	Screening Level		
EPA Test Method 8260 (units are ug/L)				
Benzene	0.5	71	nd	NA
Ethylbenzene	0.5	5,000	nd	NA
Toluene	0.5	86	nd	NA
Xylenes	0.5	2,200	0.4 J	NA
MTBE	0.5	8,000	nd	NA
EPA Test Method 8310 (units are ug/L)				
Naphthalene	24	470	nd	nd
Acenaphthylene	49		nd	nd
Acenaphthene	4.9		nd	nd
Fluorene	4.9		4.7 J	nd
Phenanthrene	2.4		11	nd
Anthracene	2.4		nd	nd
Fluoranthene	1.9		nd	nd
Pyrene	0.97		1.4	nd
Benzo(a)anthracene	0.49		0.96	nd
Chrysene	0.49		3.9	nd
Benzo(b)fluoranthene	0.97		nd	nd
Benzo(k)fluoranthene	0.49		nd	nd
Benzo(a)pyrene	0.49	0.049	nd	nd
Dibenz(a,h)anthracene	0.97		nd	nd
Benzo(g,h,i)perylene	0.97		nd	nd
Indeno(1,2,3-cd)pyrene	0.68		nd	nd
DHS Test Method 8015-Modified (units are ug/L)				
TPH (Diesel C10-C24)	100	640	35,000	nd
TPH (Motor Oil C24-C36)	600	640	490 J,L,Y	nd

Legend:

nd = not detected

NA = not analyzed

TPH = Total Petroleum Hydrocarbon

Data Qualifiers:

J = estimated value

Y = fuel unlike diesel

L = lighter hydrocarbons contributed to the quantitation

Notes:

1. Shaded result indicates that the value exceeds the applicable action and/or screening level.

The surface water sample was analyzed for BTEX and MTBE using EPA Method 8260. Total xylenes were the only constituents detected at an estimated value of 0.4 µg/L.

PAHs were analyzed using EPA Method 8310. Naphthalene, acenaphthylene, acenaphthene, anthracene, fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene were not detected in the surface water sample. Fluorene, phenanthrene, pyrene, benzo(a)anthracene and chrysene were detected below screening levels. No PAHs were detected in the temporary well, SB5.

TPH as diesel/motor oil was analyzed using DHS Method 8015-M, extractable. Diesel and motor oil were not detected in the temporary well, SB5. Diesel was detected at 35,000 µg/L in the standing water. Motor oil was detected at an estimated value of 490 µg/L.

The soil confirmation samples were all below action levels with the exception of AST637-SB7-4 which was at 18,000 mg/kg. No further excavation was conducted because of the multiple utilities in the area (Figure 3-1, Building 637 Excavation).

The surface water sample from the excavation indicates that there are elevated levels of TPH as diesel in the water, 35,000 µg/L. No BTEX compounds were detected with the exception of total xylenes at an estimated value, 0.4 µg/L. Based on this, there is no threat to the indoor or outdoor receptor from volatiles.

No constituents were detected in the down gradient sampling point. This indicates that the contamination is not migrating. Based on the lack of detections in the groundwater at the sampling point, no further action is recommended in association with groundwater at this site.

3.1.4 Conclusions and Recommendations

The site does not contain contamination that is a risk to receptors at the site, with the exception of the area between the water line and building on the north side of the excavation. This area is very small, consisting of approximately 25 square feet. The interactive map that will be developed for the ECOP will show the residual contamination remaining. If any future work is done in this area on the building or utilities, the construction worker should be notified of the remaining contamination.

It is recommended that no further action be taken at this site. A summary spreadsheet is included in Appendix G and a letter will be sent to the Water Board requesting formal closure of the site.

3.2 Building 407 AST Site

The Building 407 indoor AST serviced a hydraulic lift (Photo 3-1, Building 407 AST). The small, 20 gallon, tank was no longer being used, therefore the tank was permanently taken out of service.



Photo 3-2 Building 407 AST

3.2.1 Removal Activities

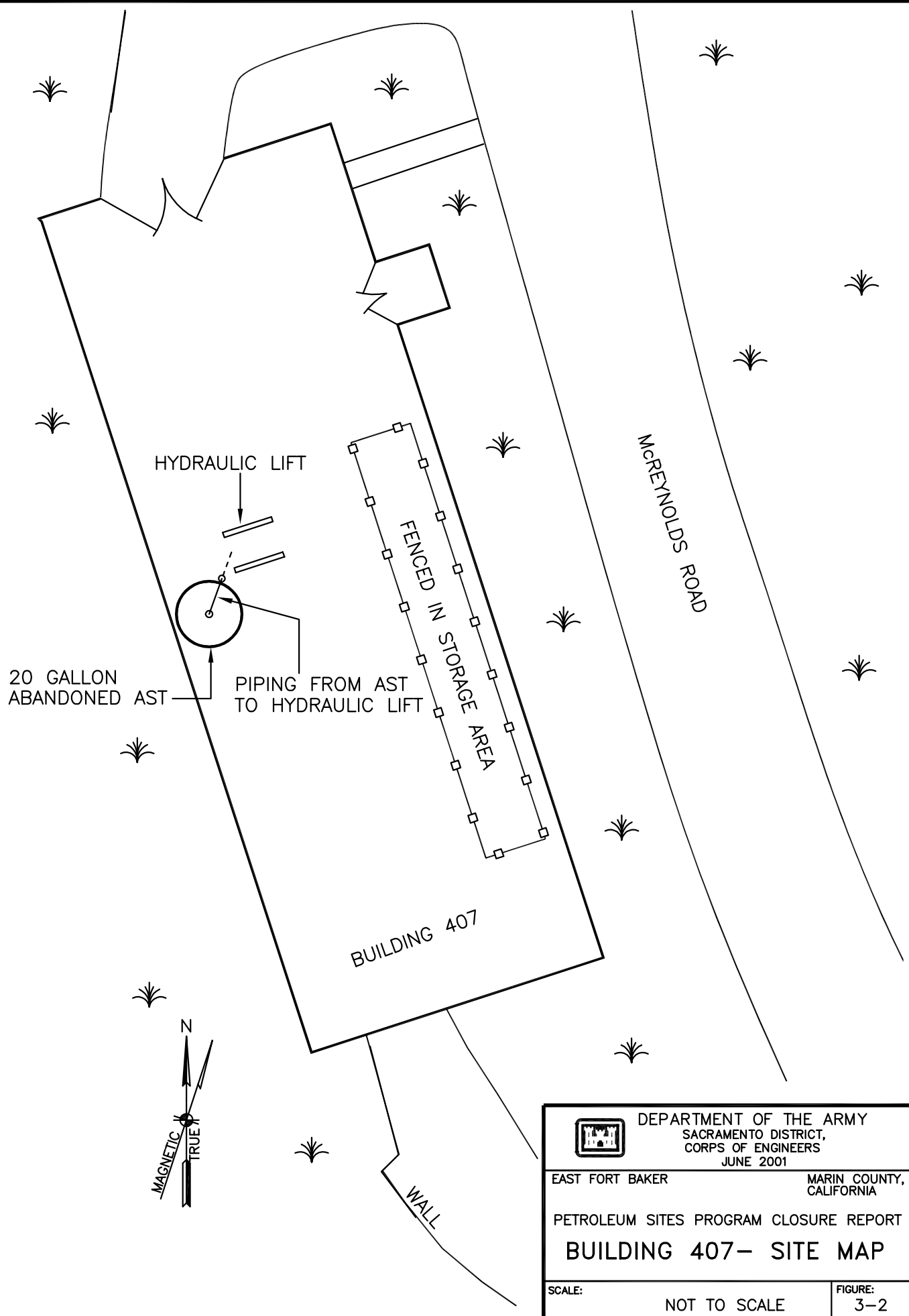
Geofon drained and cleaned the tank of its hydraulic fluid. Following cleaning, they applied 9.5 pounds of pressure to the lift, making the lift raise slightly. The pressure held for 24 hours indicating that the piping is in good condition. Geofon then blind flanged all fill and drain ports rendering the tank unfillable.

The hydraulic fluid was sampled. No polychlorinated biphenyls (PCBs) were detected in the product. Analytical results are shown in Appendix C. The fluid was transported off site and disposed of by Evergreen Environmental Services.

3.2.2 Conclusions and Recommendations

The AST has been drained, cleaned, pressure tested and rendered unfillable. Because the piping is in good condition, as shown by the pressure test, the Army is recommending no further action be taken at this site. Appendix G of this document contains the site summary form including all pertinent information. A formal request for closure will be sent to the Water Board for concurrence.

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3.3 Building 699 UST Site

The Building 699 UST site was discovered during a separate removal activity while excavating the drain pipe from the Engine Repair Shop. The Contractor noticed a fill port located against the building and determined that a UST was full and located just below the ground surface.

Upon discovery, Geofon was tasked to remove the tank in accordance with all local laws and regulations. Tim Underwood, of Marin County Waste Management, was contacted and informed of this recently located tank. Geofon then applied for and received a county permit to remove the tank (See Appendix B).



Photo 3-3 Building 699 UST being removed

3.3.1 Removal Activities

On September 11, 2000 Geofon drained the tank contents into a 55 gallon steel drum and then rinsed the tank with 5 gallons of water using high pressure/low volume methods to remove residual product. The tank was 14 inches in diameter and 4 feet in length, approximately 20 gallons. The tank was then inerted using 10 lbs of dry ice. After inerting the UST, the oxygen and LEL readings were 3% and 0%, respectively. The

tank was labeled (28578), removed by ECI, manifested and taken to their facility for recycling (See Appendix B for certificate of destruction). The piping from the tank was previously disconnected; therefore, it was not possible to determine its former use.

The tank was inspected upon removal and found to have no pitting. Geofon then removed some additional soil beneath the tank to remove a stained area which was located on the fill port end of the tank to 2.5 feet bgs. After receiving the analytical results from confirmation sampling, additional soil was removed from the southern portion of the excavation (Figure 3-3, Building 699 Excavation Map) to 4.5 feet bgs.

The contents of the tank were sampled by Geofon. After receiving the analytical results, the contents and rinsate were transported and disposed by Evergreen Environmental Services. Approximately 4 cubic yards of soil were excavated at this site. The soil generated from overexcavating was sent to Kettleman City Landfill for disposal.

The excavation was backfilled in 8 inch lifts with soil obtained from American Soil Products. Compaction of the backfill placed was completed using a hoe pack.

3.3.2 Confirmation Sampling Activities

Geofon collected two confirmation samples from the base of the excavation, CS1 and CS2. The samples were sent to the Government's contracted laboratory to be analyzed for TPH as diesel/motor oil by DHS Method 8015-M extractable, TPH as gasoline by DHS Method 8015-M purgeable, PAHs by EPA Method 8310, BTEX/MTBE by EPA Method 8260, and lead by EPA Method 6010B. TPH gasoline and BTEX/MTBE samples were collected using Encore™ samplers. The remaining samples were collected using a stainless steel spoon and glass jars. Primary samples, field duplicates, matrix spike/matrix spike duplicates and equipment blanks were collected. Following overexcavation, a PAH sample was collected and sent for analysis.

3.3.3 Evaluation of Results

The action levels for this site are as developed in the Petroleum Sites Management Plan. Table 3-3, Summary of Soil Action Levels for the UST 699 Site, is included to show how the action levels were chosen. Action levels less than 3 feet bgs are applicable to CS1 and CS2. Sampling point CS2 was overexcavated, therefore there is no surface contamination remaining at the CS2 location. The action levels that apply for CS2A are those developed for contamination greater than 3 feet bgs, construction/excavation worker and leaching to groundwater, because all surface contamination has been removed. The most restrictive action levels are chosen based on appropriate receptors and depth of contamination. No DAF was used for leaching criteria because the site is less than 300 feet from the mean higher high water line. The site is not located in a residential area or in the Sediment Protection Zone, therefore these action levels were not evaluated. The area of this site is 28 square feet, therefore, the terrestrial receptor action level multiplier is 571.14. See Section 2.3 of the Petroleum Sites Management Plan for details on the development of the action levels.

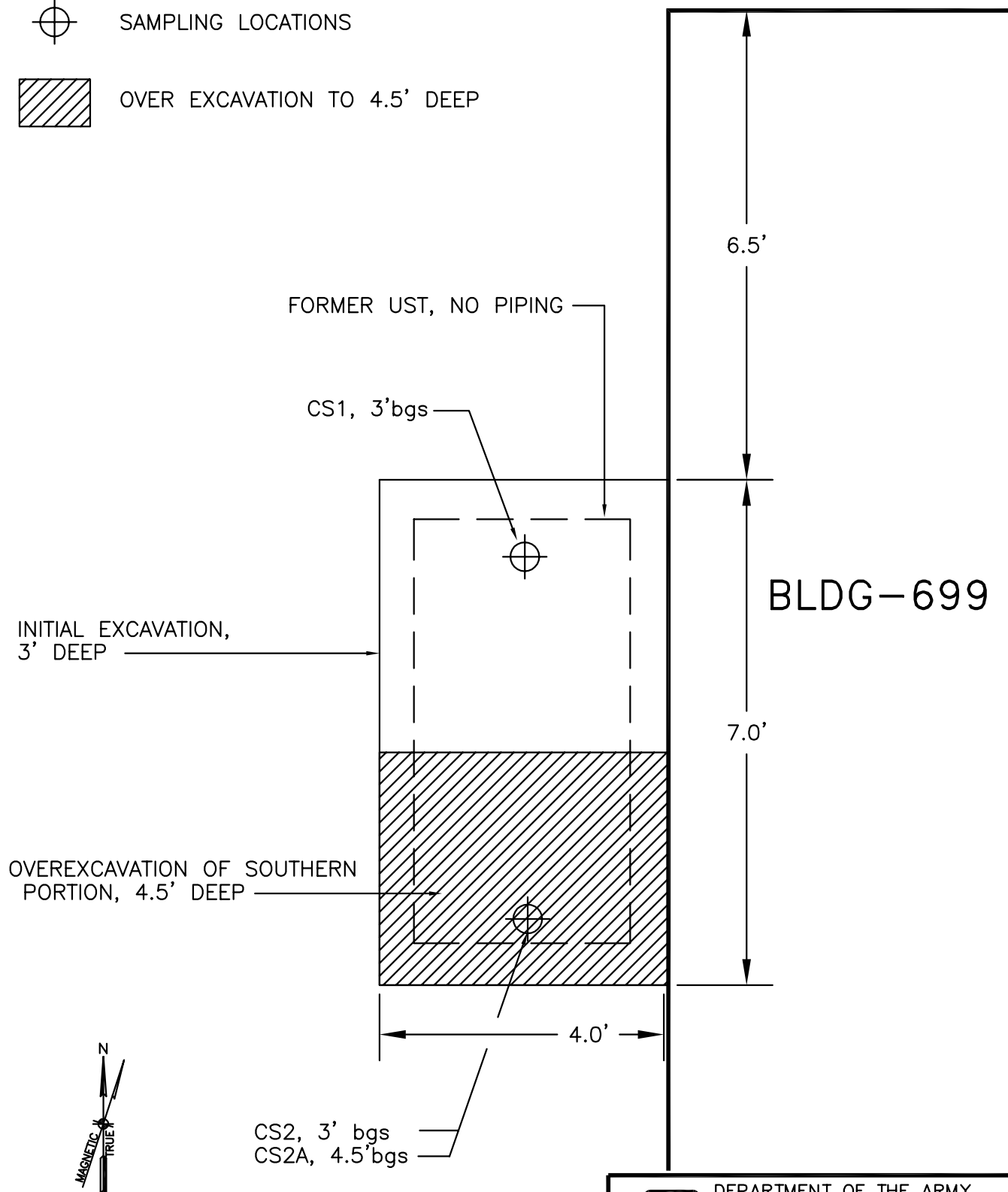
LEGEND:



SAMPLING LOCATIONS



OVER EXCAVATION TO 4.5' DEEP



REF: GEOFON, INC.
DRAWING No. 05-5524
DATE: 1/10/01



DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT,
CORPS OF ENGINEERS
JUNE 2001

EAST FORT BAKER

MARIN COUNTY,
CALIFORNIA

PETROLEUM SITES PROGRAM CLOSURE REPORT

BUILDING 699 EXCAVATION

SCALE:

1" = 2'

FIGURE:

3-3

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Table 3-4 Summary of Soil Action Levels for the UST 699 Site

Constituent	Terrestrial Ecological Receptor Soil Action Levels	Recreational Receptor Soil Action Levels	Construction/ Excavation Worker Soil Action Levels	Soil Screening Levels based on Leaching to Groundwater with Discharge to Marine Receptors	< 3' Action Level	Controlling Receptor	> 3' Action Level	Controlling Receptor
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	<3'	mg/kg	>3'
Gasoline	348,395	2,400	8,500	629	629	Leach	629	Leach
Diesel	399,798	3,200	7,900	518	518	Leach	518	Leach
Fuel Oil	559,717	4,500	7,900	518	518	Leach	518	Leach
Benzene	22,846	1.5	6.5	2.73	1.5	Rec	2.73	Leach
Toluene	154,208	1,200	670	930	670	Constr	670	Constr
Ethylbenzene	71,393	1,900	510	13	13	Leach	13	Leach
Xylenes	31,413	2,500	360	358	358	Leach	358	Leach
Total PAHs (carcinogenic)	-	B(a)P eq (0.1)	B(a)P eq (2.6)	-	0.1	Rec	2.6	Constr
Total PAHs (non-carcinogenic)	-	1,100	92	19	19	Leach	19	Leach
Benzo(a)pyrene	17,842	0.1	2.6	0.13	0.1	Rec	0.1	Leach
Benzo(b)fluoranthene	-	1.0	26	-	1.0	Rec	26	Constr
Benzo(k)fluoranthene	-	1.0	26	-	1.0	Rec	26	Constr
Benzo(a)anthracene	-	1.0	26	-	1.0	Rec	26	Constr
Chrysene	-	10	260	-	10	Rec	260	Constr
Anthracene	-	13,800	92	-	92	Constr	92	Constr
Benzo(g,h,i)perylene	-	1,400	92	-	92	Constr	92	Constr
Flouranthene	-	1,900	92	-	92	Constr	92	Constr
Phenanthrene	-	1,400	92	-	92	Constr	92	Constr
Pyrene	-	1,400	92	-	92	Constr	92	Constr
Naphthalene	-	1,100	8.6	402	8.6	Constr	8.6	Constr
Lead	272,434	400	400	-	400	Rec	400	Constr
MTBE	-	4,700	830	447	447	Leach	447	Leach

Legend:

Rec = Recreational Receptor
 Constr = Construction/Excavation Worker
 Leach = Leaching to Groundwater
 B(a)P eq = benzo(a)pyrene equivalent

Notes:

1. Terrestrial is multiplied by 571.14 (28 sf).
2. No DAF is applied because of the proximity to the Bay.
3. See Section 1.9 for a description of B(a)Peq.

Table 3-5 Analytical Results from the UST 699 Soil Sampling

UST 699			Location	CS1	CS2	CS2A
			Depth (ft.)	3	3	4.5
Analyte	Reporting Limit	Action Level <3' bgs	Action Level > 3' bgs			
EPA Test Method 8260 (soil units are mg/kg)						
Benzene	0.0049 -0.0058	1.5	2.73	nd	nd	NA
Toluene	0.0049 -0.0058	670	670	nd	nd	NA
Ethylbenzene	0.0049 -0.0058	13	13	nd	nd	NA
Total Xylenes	0.0049 -0.0058	358	358	nd	nd	NA
MTBE	0.0049 -0.0058	447	447	nd	nd	NA
EPA Test Method 8310 (soil units are mg/kg)						
Naphthalene	0.18 - 0.90	8.6	8.6	nd	nd	nd
Acenaphthylene	0.37 - 1.8			nd	nd	nd
Acenaphthene	0.037 - 0.18			nd	nd	nd
Fluorene	0.037 - 0.18			nd	nd	nd
Phenanthrene	0.018 - 0.089	92	92	0.034	0.16	0.012 J
Anthracene	0.018 - 0.090	92	92	nd	nd	nd
Fluoranthene	0.015 - 0.072	92	92	0.056	0.65	0.0093 J
Pyrene	0.0074 - 0.036	92	92	0.037	0.47	0.011
Benzo(a)anthracene	0.0036 - 0.018	1.0	26	0.018	0.13	0.0037 J
Chrysene	0.0036 - 0.018	10.0	260	0.02	0.21	0.0058
Benzo(b)fluoranthene	0.0074 - 0.036	1.0	26	0.013	0.16	nd
Benzo(k)fluoranthene	0.0036 - 0.018	1.0	26	0.0055	0.092	0.0027 J
Benzo(a)pyrene	0.0036 - 0.018	0.1	0.13	0.0077	0.21	0.0038 J
Dibenz(a,h)anthracene	0.0074 - 0.036			0.029	0.28	nd
Benzo(g,h,i)perylene	0.0074 - 0.036	92	92	0.013	0.26	0.0056 J
Indeno(1,2,3-cd)pyrene	0.0036 - 0.018			0.011	0.14	0.015
Benzo(a)pyrene equivalent		0.1	2.6	0.012	0.25	0.004
DHS Test Method 8015-Modified (soil units are mg/kg)						
TPH (Gasoline C7-C12)	0.18 - 0.21	629	629	nd	nd	NA
TPH (Diesel C10-C24)	1.1	518	518	24 H	110 H	NA
TPH (Motor Oil C24-C36)	5.4 - 5.5	518	518	29 L	92 L	NA
EPA Test Method 6010B (soil units are mg/kg)						
Lead	0.16	400	400	8.2	85	NA

Legend:

nd = not detected

NA = not analyzed

TPH = Total Petroleum Hydrocarbon

Data Qualifiers:

H = heavier hydrocarbons contributed to the quantitation

L = lighter hydrocarbons contributed to the quantitation

J = estimated

Notes:

1. Shaded result indicates that the value exceeds the applicable action level.

2. Sampling point C2 was overexcavated due to the benzo(a)pyrene contamination. Sample C2A was taken following overexcavation

Table 3-5, Analytical Results from the UST 699 Soil Sampling, is included to show the results of the confirmation sampling event.

BTEX and MTBE samples were analyzed using EPA Method 8260. No constituents were detected.

PAH samples were analyzed using EPA Method 8310. Naphthalene, acenaphthylene, acenaphthene, fluorene and anthracene were not detected in any of the samples. Benzo(b)fluoranthene and dibenz(a,h)anthracene were detected in samples CS1 and CS2 below action levels but not detected in sample CS2A. Phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(k)fluoranthene, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene were detected in all the samples below action levels. Benzo(a)pyrene was detected in samples CS1 and CS2A below action levels and detected in CS2 at 0.21 mg/kg above action levels. The benzo(a)pyrene equivalencies for samples CS1, CS2, and CS2A are 0.012 mg/kg, 0.25 mg/kg, and 0.004 mg/kg, respectively. CS2 exceeds the action level of 0.1 mg/kg for surface receptors, however this area was overexcavated. CS1 is below the surface action level of 0.1 mg/kg and CS2A is below the subsurface action level of 2.6 mg/kg.

TPH as gasoline and diesel/motor oil samples were analyzed using DHS Method 8015-M, purgeable and extractable, respectively. Gasoline was not detected in either sample. Diesel was detected at 24 mg/kg and 110 mg/kg with heavier hydrocarbons contributing to the quantitation. Motor oil was detected at 29 mg/kg and 92 mg/kg with lighter hydrocarbons contributing to the quantitation.

Lead samples were analyzed using EPA Method 6010B. Lead was detected in both samples at 8.2 mg/kg and 85 mg/kg.

All results were below action levels with the exception of benzo(a)pyrene, 0.21 mg/kg. Geofon then overexcavated to a depth of 4.5 feet bgs on the southern end of the excavation and an additional sample was collected and analyzed for PAHs only.

The results following overexcavation revealed only trace amounts of PAHs, all below action levels. The excavation was then backfilled to surrounding grade.

3.3.4 Conclusions and Recommendations

The UST and all contaminated soil above action levels have been removed from the site. The site does not contain contamination that is a risk to receptors. It is recommended that no further action be taken at this site. A summary spreadsheet is included in Appendix G and a letter will be sent to the Water Board and Marin County Office of Waste Management requesting formal closure of the site.

4.0 RECOMMENDATIONS AND CONCLUSIONS

Wharf Tanks: The wharf tanks site is not located on the BRAC property and no detections above screening levels were found in the groundwater sample, therefore no further action is recommended at this site in relation to the BRAC property. No formal request for closure will be sent to the Water Board for this site since it is on NPS lands.

FDS Site C-10: The FDS C-10 site does not contain contamination that is a risk to receptors. The interactive map that will be developed for the ECOP will show the residual contamination remaining. If any future work is done in this area that will change the site conditions, the contamination left in place may need to be examined to determine if there is a risk to human health or the environment. No further action is recommended at this site.

FDS Site C-1: No constituents exceed the subsurface action levels with the exception of diesel/motor oil. No further action is recommended at this site due to the physical constraints of excavating any further. The interactive map that will be developed for the ECOP will show the residual contamination remaining. No further action is recommended at this site.

Even with the elevated levels of fuel oil in the subsurface at the representative site C-1, the only PAH that exceeded action levels for surface receptors was benzo(b)fluoranthene. The remaining residual petroleum contamination along the former FDS is well below action levels. It is unlikely that the PAHs would exceed action levels along the remainder of the FDS. The interactive map that will be developed for the ECOP will show the residual contamination remaining. Construction workers should be made aware of the potential contamination in the area. No further action is recommended at the entire Main FDS site.

FDS Site C-12: The well placed near the Building 637 site was used to evaluate the potential release to groundwater for the FDS C-12 site. No contamination was detected in this well, therefore no further action is recommended at this site.

AST 637 Site: The AST 637 site does not contain contamination that is a risk to receptors at the site, with the exception of the area between the water line and building on the north side of the excavation. The interactive map that will be developed for the ECOP will show the residual

contamination remaining. If any future work is done in this area on the building or utilities, the construction worker should be notified on the remaining contamination. It is recommended that no further action be taken at this site.

AST 407 Site: The 407 AST has been drained, cleaned, pressure tested and rendered unfillable. Because the piping is in good condition, as shown by the pressure test, the Army is recommending no further action be taken at this site.

UST 699 Site: The UST and all contaminated soil above action levels have been removed from the site. The site does not contain contamination that is a risk to receptors. It is recommended that no further action be taken at this site.

5.0 REFERENCES

Environmental Science and Engineering, Inc. (ESE) 1983. *Final Installation Assessment of Presidio of San Francisco, San Francisco, California.*

Geofon, *Final Work Plan, Building 637 and 407 Aboveground Storage Tank Removals, East Fort Baker, Marin County, California*, July 2000.

Remedial Constructors, Inc. (RCI), *Underground Storage Tank Removal Report, East Fort Baker, California*, January 1998.

RESNA Industries, Inc. (RESNA), 1993. *Underground Storage Tank Closure Report for East Fort Baker, Area E.*

U.S. Army Corps of Engineers (USACE 1997), *Final Work Plan, BRAC Site Inspection, East Fort Baker, California*, September 1997.

U.S. Army Corps of Engineers (USACE 1999), *Final BRAC Site Inspection Report, East Fort Baker, California*, February 1999.

U.S. Army Corps of Engineers (USACE 2000a), *Final BRAC SI Work Plan Addendum, Petroleum Sites Program, East Fort Baker, California*, August 2000.

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U.S. Army Corps of Engineers (USACE 2000c), *Final Site Safety and Health Plan*, July 2000.

Woodward-Clyde (W-C), 1995. *U.S. Army Base Realignment and Closure Program, Environmental Baseline Survey Report*, East Fort Baker, California, March 10, 1997.

APPENDIX A

PHOTOGRAPHS

637 AST Removal and Excavation

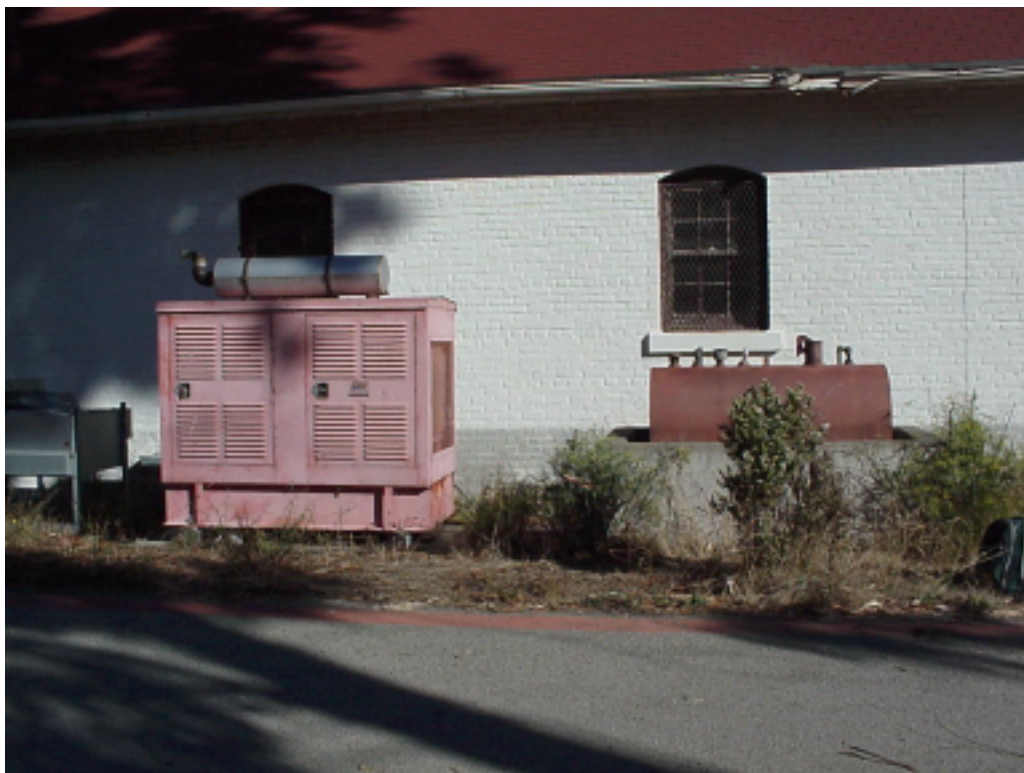


Photo 1 – 637 AST Site Prior to Removal Activities



Photo 2 – Preparing to Remove AST from Secondary Containment



Photo 3 – Lifting AST from Secondary Containment for Disposal



Photo 4 - Removing AST Piping



Photo 5 – Beginning of Excavation, Storm Drain Located



Photo 6 – Staging Area at 637 AST Site – With Soil Storage Bin, Generator and New AST



Photo 7 – Staging Area at 637 Site with Soil Storage Bin and Baker tank



Photo 8 – Storm Drain Broken During Excavation Activities



Photo 9 – USACE, NPS and Geofon Assessing Utilities



Photo 10 – Pumping Groundwater from Excavation



Photo 11 – Final Excavation



Photo 12 – Sampling Groundwater from Excavation



Photo 13 – Backfilling Excavation



Photo 14 – Repairs to Storm Drain and Electrical Conduit



Photo 15 – Backfill and compacting with Backhoe Bucket



Photo 16 – Generator on New Concrete Pad in its Final Position



Photo 17 – New AST in its Final Position



Photo 18 – Building 637 AST Site Following Construction

699 UST Removal



Photo 19 – UST 699 Site Discovery



Photo 20- UST 699 Exposed Tank



Photo 21 – Rinsing UST 699 using High Pressure/Low Volume Methods



Photo 22 – Geofon Inerting UST 699



Photo 23 – Monitoring Tank with Oxygen Meter



Photo 24 – Labeled Tank Ready for Removal and Disposal



Photo 25 - UST 699 Site in Preparation for 1 foot Excavation



Photo 26 – Excavating to 1 Foot below Bottom of Tank at UST 699 Site



Photo 27 – Completed Initial Excavation at UST 699 Site



Photo 28 – Confirmation Soil Sampling at UST-699-CS-1



Photo 29 – UST 699 Tank Contents Following Removal



Photo 30 – Sampling Tank Contents from UST 699



Photo 31 – UST 699 Site Following Completion

407 AST Abandonment



Photo 32 – AST 407



Photo 33 – Sampling AST 407 Tank Contents



Photo 34 – Building 407 AST after rendering it unfillable

Drilling Activities



Photo 35 – Geoprobe at Groundwater Sampling Point AST637-SB5



Photo 36 – Geoprobe at Groundwater Sampling Point for Wharf Tanks (WT-SB1)



Photo 37 – Geoprobe set up at C-1 Sampling Point – This Point was eventually Hand Augered



Photo 38 – Deconning Drilling Equipment

APPENDIX B

MANIFESTS & PERMITS

5240945

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA, CALL 1-800-852-7550

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
3. Generator's Name and Mailing Address MECCA L ALLEY (415) 289-7411		CAL 0000146594311281		A. State Manifest Document Number 93631281	
4. Generator's Phone ()		US ARMY RESERVE FORT BAKER B-DC 602 MURRAY CIRCLE Sausalito, CA 94965-5099		B. State Generator's ID	
5. Transporter 1 Company Name ECOLOGY CONTROL INDUSTRIES		6. US EPA ID Number CA 00002030173		C. State Transporter's ID [Reserved.]	
7. Transporter 2 Company Name		8. US EPA ID Number		D. Transporter's Phone 510-235-1393	
9. Designated Facility Name and Site Address ECOLOGY CONTROL INDUSTRIES 265 PARR BLVD RICHMOND CA 94801		10. US EPA ID Number CA 00009466392		E. State Transporter's ID [Reserved.]	
				F. Transporter's Phone	
				G. State Facility's ID	
				H. Facility's Phone 510-235-1393	
11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)		12. Containers No. Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. WASTE EMPTY STORAGE TANK NON RCRA HAZARDOUS WASTE SOLID		001 TP	000275	P	State 512 EPA/Other
b.					State NONE EPA/Other
c.					State EPA/Other
d.					State EPA/Other
J. Additional Descriptions for Materials Listed Above QTY. 1-275 EMPTY STORAGE TANK # 28362-28449 TANK(S) HAVE BEEN INERTED WITH 15 LBS DRY ICE PER 1000 GALLON CAPACITY		K. Handling Codes for Wastes Listed Above a. 01 b. c. d.			
15. Special Handling Instructions and Additional Information Wear proper protective equipment while handling. Weights or volumes are approximate. 24 Hour emergency telephone number: 289-649-0770 24 Hour emergency contact: Robert Castaneda DOT ERG# 171					
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.					
Printed/Typed Name MECCA L. GALLE		Signature MECCA L. GALLE		Month Day Year 02/02/00	
17. Transporter 1 Acknowledgement of Receipt of Materials Printed/Typed Name GRIFFIN WISE		Signature GRIFFIN WISE		Month Day Year 03/03/00	
18. Transporter 2 Acknowledgement of Receipt of Materials Printed/Typed Name		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19. Printed/Typed Name DAVID SATO					
Signature DAVID SATO		Month Day Year 08/02/00			

DO NOT WRITE BELOW THIS LINE.

DAY OR NIGHT
TELEPHONE
(510) 235-1393

CERTIFICATE CERTIFIED SERVICES COMPANY

255 Parr Boulevard • Richmond, California 94801

NO. 3597

CUSTOMER

JOB NO. 1000000000
GEOGRAPHIC

FOR: ECOLOGY CONTROL INDUSTRIES TANK NO. 28449

LOCATION: RICHMOND, CA DATE: 8/2/2000 TIME: 2:05:33

TEST METHOD VISUAL GASTECH 1314 SMPN LAST PRODUCT DIESEL

This is to certify that I have personally determined that this tank is in accordance with the American Petroleum Institute and have found the condition to be in accordance with its assigned designation. This certificate is based on conditions existing at the time the inspection herein set forth was completed and is issued subject to compliance with all qualifications and instructions.

TANK SIZE 275 Gal Tank CONDITION SAFE FOR FIRE

REMARKS: OXYGEN 20.9% LOWER EXPLOSIVE LIMIT LESS THAN 0.1% ECOLOGY CONTROL INDUSTRIES
FERRY CERTIFIES THAT THE ABOVE NUMBERED TANK HAS BEEN CUT OPEN, PROCESSED
AND THEREFORE DESTROYED AT OUR PERMITTED HAZARDOUS WASTE FACILITY
ECOLOGY CONTROL INDUSTRIES HAS THE APPROPRIATE PERMITS FOR AND HAS ACCEPTED
THE TANK BEING CUT OPEN FOR PROCESSING

In the event of any physical or atmospheric changes affecting the gas-free conditions of the above tanks, or if in any doubt, immediately stop all hot work and contact the undersigned. This permit is valid for 24 hours if no physical or atmospheric changes occur.

STANDARD SAFETY DESIGNATION

SAFE FOR MEN: Means that in the compartment or space so designated (a) The oxygen content of the atmosphere is at least 19.5 percent by volume; and that (b) Toxic materials in the atmosphere are within permissible concentrations; and (c) In the judgment of the Inspector, the residues are not capable of producing toxic materials under existing atmospheric conditions while maintained as directed on the Inspector's certificate.

SAFE FOR FIRE: Means that in the compartment so designated (a) The concentration of flammable materials in the atmosphere is below 10 percent of the lower explosive limit; and that (b) In the judgment of the Inspector, the residues are not capable of producing a higher concentration that permitted under existing atmospheric conditions in the presence of fire and while maintained as directed on the Inspector's certificate, and further, (c) All adjacent spaces have either been cleaned sufficiently to prevent the spread of fire, are satisfactorily inerted, or in the case of fuel tanks, have been treated as deemed necessary by the Inspector.

The undersigned representative acknowledges receipt of this certificate and understands the conditions and limitations under which it was issued.

REPRESENTATIVE

TITLE

INSPECTOR

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802. WITHIN CALIFORNIA, CALL 1-800-852-7550

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
3. Generator's Name and Mailing Address US ARMY RESERVE PORT BAKER BUILDING 602, MURRAY CIRCLE SAUSALITO, CA 94965-5099		4. Generator's Phone (415) 289-2411	5. US EPA ID Number CA1208014659431159	A. State Manifest Document Number 99631159	B. State Generator's ID
6. Transporter 1 Company Name Ecology Control Industries		7. US EPA ID Number CA0982030173	C. State Transporter's ID (Reserved)	D. Transporter's Phone 610-236-1393	E. State Transporter's ID (Reserved)
8. Designated Facility Name and Site Address Evergreen Oil Co. 5880 Smith Avenue Newark CA 94560		9. US EPA ID Number CA0980887418	G. State Facility's ID CA0980887418	H. Facility's Phone 510-795-4401	
11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)		12. Containers No. Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. OIL AND WATER Non-RCRA hazardous waste liquid		001 TT	1000	G	State 221 EPA/Other RCRA
b.					State EPA/Other
c.					State EPA/Other
d.					State EPA/Other
1. Additional Descriptions for Materials Listed Above OIL AND WATER MIXTURE		K. Handling Codes for Wastes Listed Above		a. OF	
15. Special Handling Instructions and Additional Information Wear proper protective equipment while handling. Weights or volumes are approximate. 24 Hour emergency telephone number (800) 788-1393 (ECI Dispatcher). DOT ERG# 11a) 171 ECI JN 5240945 PO#					
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, If I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.					
Printed/Typed Name Meagan L. Galie		Signature <i>Meagan L. Galie</i>		Month Day Year 08 02 00	
17. Transporter 1 Acknowledgement of Receipt of Materials Printed/Typed Name CHRIS WISE / James Ratchford		Signature <i>Chris Wise</i>		Month Day Year 08 02 00	
18. Transporter 2 Acknowledgement of Receipt of Materials Printed/Typed Name		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19. Printed/Typed Name Robert Batiz					
Signature <i>Robert Batiz</i>		Month Day Year 08 01 00			

DO NOT WRITE BELOW THIS LINE.

B & J LANDFILL
6426 HAY ROAD
VACAVILLE, CA 95687
(707) 678-4718

38878

NON-HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. NOT APPLICABLE	Manifest Document No.	2. Page 1 of	Authorization No. 489
3. Generator's Name and Mailing Address FORT BAKER ARMY RESERVE CENTER Bldg 604 MURRAY CIRCLE SAUSALITO, CA. 94965-5099		ACCT NO. 8656			
4. Generator's Phone ()					
5. Transporter 1 Company Name GCT 1, 000		6. US EPA ID Number NOT APPLICABLE		A. Transporter's Phone 1 800-728 1593	
7. Transporter 2 Company Name		8. US EPA ID Number NOT APPLICABLE		B. Transporter's Phone	
9. Designated Facility Name and Site Address B & J LANDFILL 6426 HAY ROAD VACAVILLE, CA 95687		10. US EPA ID Number NOT APPLICABLE		C. Facility's Phone (707) 451-3276	
11. Waste Shipping Name and Description			12. Containers No. Type	13. Total Quantity	14. Unit Wt/Vol
a. TPH CONTAINED SOILS			1 CM	1000	10 Y
b.					
c.					
d.					
D. Additional Descriptions for Materials Listed Above			E. Handling Codes for Wastes Listed Above 03		
15. Special Handling Instructions and Additional Information					
16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.					
Printed/Typed Name MERYIN ALLEY		Signature m. alley		Month Day Year 11 02 00	
17. Transporter 1 Acknowledgement of Receipt of Materials Printed/Typed Name CHRISTOPHER L. ROSE		Signature Christopher L. Rose		Month Day Year 11 02 00	
18. Transporter 2 Acknowledgement of Receipt of Materials Printed/Typed Name		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.					
Printed/Typed Name JERRY SOUSA		Signature Jerry Sousa		Month Day Year 11 03 00	

TRANSPORTER #1

NO. 775

ECI SPARKS

JAN. 22, 2001 12:47PM

6426 HAY ROAD
VACAVILLE, CA 95687
(707) 678-4718

NON-HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. NOT APPLICABLE	Manifest Document No.	2. Page 1 of	Authorization No. 489 CEDFO
3. Generator's Name and Mailing Address US ARMY RESERVE CENTER BLDG. 604 MURRAY CIR. FT. BAKER SAUSALITO, CA. 94965-5099		ACCT # 8656			
4. Generator's Phone 415 299-7411		A. Transporter's Phone 510 235-1343			
5. Transporter 1 Company Name ECOLOGIC CONTROL INC.		6. US EPA ID Number NOT APPLICABLE		B. Transporter's Phone 649 433030173	
7. Transporter 2 Company Name		8. US EPA ID Number NOT APPLICABLE		B. Transporter's Phone	
9. Designated Facility Name and Site Address B & J LANDFILL 6426 HAY ROAD VACAVILLE, CA 95687		10. US EPA ID Number NOT APPLICABLE		C. Facility's Phone (707) 451-3276	
11. Waste Shipping Name and Description		12. Containers		13. Total Quantity	14. Unit Wt/Vol
a. TPH - CONTAMINATED SOILS		No. Type		Quantity	Unit Wt/Vol
		1 2		16	Y
b.					
c.					
d.					
D. Additional Descriptions for Materials Listed Above		E. Handling Codes for Wastes Listed Above 03			
15. Special Handling Instructions and Additional Information EET JOB # 5240945					
16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.					
Printed/Typed Name MERVIN ALLEY		Signature (FOR) MERVIN ALLEY		Month Day Year 11 03 00	
17. Transporter 1 Acknowledgement of Receipt of Materials		Signature W. A. KINAT		Month Day Year 11 03 00	
18. Transporter 2 Acknowledgement of Receipt of Materials		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.					
Printed/Typed Name Terry Sousa		Signature Terry Sousa		Month Day Year 11 03 00	

TRANSPORTER #1

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

NOT APPLICABLE

Manifest
Document No.

2. Page 1
of

#489

3. Generator's Name and Mailing Address

US ARMY RESERVE CENTER
BLDG. 604 MURKIN CTR. FT. BAKER
SA USALITO, CA. 94965-5099

ACCT#
8656

4. Generator's Phone

415 289-7411

5. Transporter 1 Company Name

ECOLOGY CONTROL INC.

6. US EPA ID Number

NOT APPLICABLE

A. Transporter's Phone

(510) 235-1393

7. Transporter 2 Company Name

8. US EPA ID Number

B. Transporter's Phone

9. Designated Facility Name and Site Address

10. US EPA ID Number

C. Facility's Phone

11. Waste Shipping Name and Description

a. TPH CONTAMINATED SOILS

12. Containers

No.

Type

13. Total
Quantity

14. Unit
Wt/Vol

1

C

10

Y

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

.03

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name

MERVIN ALLEY

Signature

(for) MERVIN ALLEY

Month Day Year

11 03 00

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

ROGER GARR

Signature

Roger Garr

Month Day Year

11 6 00

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name

Judy Hall

Signature

Judy Hall

Month

11 06 00

TRANSPORTER #1

GENERATOR

TRANSPORTER

FACILITY

B & J LANDFILL
6426 HAY ROAD
VACAVILLE, CA 95687
(707) 678-4718

30013

NON-HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. NOT APPLICABLE	Manifest Document No.	2. Page 1 of	Authorization No. #489
3. Generator's Name and Mailing Address US ARMY RESERVE 604 MURRAY CIRCLE SAUSALITO, CA 4. Generator's Phone (415) 289-7411			ACCT # 8656		
5. Transporter 1 Company Name Ecology Control Industries		6. US EPA ID Number NOT APPLICABLE	A. Transporter's Phone 1-800-765-1893		
7. Transporter 2 Company Name		8. US EPA ID Number NOT APPLICABLE	B. Transporter's Phone		
9. Designated Facility Name and Site Address B & J LANDFILL 6426 HAY ROAD VACAVILLE, CA 95687		10. US EPA ID Number NOT APPLICABLE	C. Facility's Phone (707) 451-9276		
11. Waste Shipping Name and Description			12. Containers	13. Total Quantity	14. Unit Wt/Vol
a. FUEL IMPACTED SOIL			No. 15	Type C	40 16 T
b.					
c.					
d.					
D. Additional Descriptions for Materials Listed Above N/A			E. Handling Codes for Wastes Listed Above N/A		
15. Special Handling Instructions and Additional Information N/A					
16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.					
Printed/Typed Name MERVIN ALLEY		Signature Mervin Alley		Month Day Year 11 02 00	
17. Transporter 1 Acknowledgement of Receipt of Materials		Signature Joshua Dominguez		Month Day Year 11 12 00	
Printed/Typed Name JOSHUA DOMINGUEZ		Signature		Month Day Year	
18. Transporter 2 Acknowledgement of Receipt of Materials		Signature		Month Day Year	
Printed/Typed Name		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in item 19.					
Printed/Typed Name Terry Sousa		Signature Terry Sousa		Month Day Year 11 10 00	

GENERATOR

TRANSPORTER

FACILITY

TRANSPORTER #1

P.6 NO. 775

JAN. 22. 2001 12:48PM ECI SPARKS

5240945

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA, CALL 1-800-632-7330

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1	Information in the shaded areas is not required by Federal law.
3. Generator's Name and Mailing Address FT. BAKER BLDG 604 MURRAY CIRCLE SACRAMENTO CA 94465-5079		4. Generator's Phone (415) 289-2411	5. Transporter 1 Company Name ECOLOGY CONTROL INDUSTRIES	6. US EPA ID Number CA10982030173	A. State Manifest Document Number 98301331
7. Transporter 2 Company Name		8. US EPA ID Number	9. Designated Facility Name and Site Address ECOLOGY CONTROL INDUSTRIES 255 PARR BLVD RICHMOND CA 94801		B. State Generator's ID
10. US EPA ID Number CA10009466392		11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)		C. State Transporter's ID (Reserved)	D. Transporter's Phone 510-235-1393
12. Containers		13. Total Quantity	14. Unit Wt/Vol	E. State Transporter's ID (Reserved)	
a. WASTE EMPTY STORAGE TANK NON RCRA HAZARDOUS WASTE SOLID		001	TIP	P	F. Transporter's Phone
b.					G. State Facility's ID CA109466392
c.					H. Facility's Phone 510-235-1393
d.					I. Waste Number State 512 EPA/Other NONE
J. Additional Descriptions for Materials Listed Above QTY 1 EMPTY STORAGE TANK # 28578 TANK HAS BEEN INSERTED WITH 15 LBS DRY ICE PER 1000 GALLON CAPACITY		K. Handling Codes for Wastes Listed Above a. 01		b.	
15. Special Handling Instructions and Additional Information WEAR PROPER PPE WHILE HANDLING, WEIGHTS OR VOLUMES ARE APPROXIMATE 24 HOUR EMERGENCY TELEPHONE #: 24 HOUR EMERGENCY CONTACT:					
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.					
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.					
Printed/Typed Name MELISSA KIEFFER		Signature Melissa Kieffer		Month Day Year 09/12/00	
17. Transporter 1 Acknowledgement of Receipt of Materials		Signature Chris Wise		Month Day Year 09/12/00	
18. Transporter 2 Acknowledgement of Receipt of Materials		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.					
Printed/Typed Name DAVID SATO		Signature DAVID SATO		Month Day Year 09/12/00	

DO NOT WRITE BELOW THIS LINE.

DAY OR NIGHT
TELEPHONE
(510) 235-1393

CERTIFICATE
CERTIFIED SERVICES COMPANY

255 Parr Boulevard • Richmond, California 94801

NO. 36038

CUSTOMER

JOB NO. XXXXXXXX
GEOPON

FOR: ECOLOGY CONTROL INDUSTRIES TANK NO. 28578

LOCATION: RICHMOND, CA DATE: 9/27/2000 TIME: 2:26:10

TEST METHOD VISUAL GASTECHEM 1314 OMPN LAST PRODUCT UG

This is to certify that I have personally determined that this tank is in accordance with the American Petroleum Institute and have found the condition to be in accordance with its assigned designation. This certificate is based on conditions existing at the time the inspection herein set forth was completed and is issued subject to compliance with all qualifications and instructions.

TANK SIZE 40 Gal Tank CONDITION SAFE FOR FIRE

REMARKS: OXYGEN 20.9% LOWER EXPLOSIVE LIMIT LESS THAN 11% ECOLOGY CONTROL INDUSTRIES
HEREBY CERTIFIES THAT THE ABOVE NUMBERED TANK HAS BEEN CUT OPEN, PROCESSED
AND THEREFORE DESTROYED AT OUR PERMITTED HAZARDOUS WASTE FACILITY
FOR THE PURPOSE OF REMOVAL OF THE APPROPRIATE FLAMMABLES, AND HAS ACCEPTED
THE TANK AS BEING TO BE CUT OPEN AND DESTROYED

In the event of any physical or atmospheric changes affecting the gas-free conditions of the above tanks, or if in any doubt, immediately stop all hot work and contact the undersigned. This permit is valid for 24 hours if no physical or atmospheric changes occur.

STANDARD SAFETY DESIGNATION

SAFE FOR MEN: Means that in the compartment or space so designated (a) The oxygen content of the atmosphere is at least 19.5 percent by volume; and that (b) Toxic materials in the atmosphere are within permissible concentrations; and (c) In the judgment of the Inspector, the residues are not capable of producing toxic materials under existing atmospheric conditions while maintained as directed on the Inspector's certificate.

SAFE FOR FIRE: Means that in the compartment so designated (a) The concentration of flammable materials in the atmosphere is below 10 percent of the lower explosive limit; and that (b) In the judgment of the Inspector, the residues are not capable of producing a higher concentration that permitted under existing atmospheric conditions in the presence of fire and while maintained as directed on the Inspector's certificate, and further, (c) All adjacent spaces have either been cleaned sufficiently to prevent the spread of fire, are satisfactorily inerted, or in the case of fuel tanks, have been treated as deemed necessary by the Inspector.

The undersigned representative acknowledges receipt of this certificate and understands the conditions and limitations under which it was issued.

John M. Cleaver
REPRESENTATIVE

TITLE

DAVE SANC
INSPECTOR

SP41367

See Instructions on back of page 6.

CVR3

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA, CALL 1-800-852-7550

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.		Manifest Document No.		2. Page 1 of 1		Information in the shaded areas is not required by Federal law.	
3. Generator's Name and Mailing Address US ARMY RESERVE CENTER BLDG 604 FORT BAKER SAUSALITO CA 94965-5099 4. Generator's Phone (415) 289-7411				6. US EPA ID Number CAL0000146594		A. State Manifest Document Number 20590129		B. State Generator's ID	
5. Transporter 1 Company Name CUMMINS TRANSPORTATION				8. US EPA ID Number CA0981435641		C. State Transporter's ID (Reserved)		D. Transporter's Phone 661-387-1842	
7. Transporter 2 Company Name				10. US EPA ID Number		E. State Transporter's ID (Reserved)		F. Transporter's Phone	
9. Designated Facility Name and Site Address CHEMICAL WASTE MANAGEMENT, INC. 35251 OLD SKYLINE ROAD KETTLEMAN CITY CA 93239				10. US EPA ID Number CA000646117		G. State Facility's ID CA000646117		H. Facility's Phone (559) 386-9711	
11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)				12. Containers		13. Total		14. Unit	
a. RD, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.9, UN3077, III, (LEAD)				No. Type		Quantity		Wt/Vol	
				001 DT		00018		Y	
b.								I. Waste Number	
								State 611	
								EPA/Other	
c.								State	
								EPA/Other	
d.								State	
								EPA/Other	
Additional Descriptions for Materials Listed Above				K. Handling Codes for Wastes Listed Above					
a. EA9786				a. 03		b.		c.	
								d.	
15. Special Handling Instructions and Additional Information CHEMTREC Emergency Response Number (800) 424-9300 WMI Contract									
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.									
Printed/Typed Name MERVIN ALLEY				Signature mally				Month Day Year 11/06/00	
17. Transporter 1 Acknowledgement of Receipt of Materials				Signature Alfred Atkinson				Month Day Year 11/06/00	
Printed/Typed Name Alfred Atkinson				Signature				Month Day Year	
18. Transporter 2 Acknowledgement of Receipt of Materials				Signature				Month Day Year	
Printed/Typed Name				Signature				Month Day Year	
19. Discrepancy Indication Space									
20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.									
Printed/Typed Name G Barber				Signature G Barber				Month Day Year 11/06/00	

DO NOT WRITE BELOW THIS LINE.

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
		CAK00014659426354			EES4
3. Generator's Name and Mailing Address US ARMY - FORT BAKER - BLDG 604 MURRAY CIRCLE, SAN SALITO, CA 94965			A. State Manifest Document Number 20126354		
4. Generator's Phone (415) 289-7411			B. State Generator's ID		
5. Transporter 1 Company Name EVERGREEN ENVIRONMENTAL SERVICES			C. State Transporter's ID [Reserved.]		
6. US EPA ID Number C A D 9 8 0 8 8 7 4 1 8			D. Transporter's Phone (800) 972-5284		
7. Transporter 2 Company Name			E. State Transporter's ID [Reserved.]		
8. US EPA ID Number			F. Transporter's Phone		
9. Designated Facility Name and Site Address EVERGREEN OIL, INC. 6880 Smith Avenue Newark, CA 94560			G. State Facility's ID C A D 9 8 0 8 8 7 4 1 8		
10. US EPA ID Number C A D 9 8 0 8 8 7 4 1 8			H. Facility's Phone (510) 795-4400		
11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)		12. Containers	13. Total Quantity	14. Unit	I. Waste Number
		No.	Type	Wt/Vol	State
a. (OIL) WATER NON-RCRA HAZARDOUS WASTE, LIQUID		0 0 1	T T	0 0 5 5 0	G
b.					ZZI
c.					EPA/Other None
d.					State
					EPA/Other
J. Additional Descriptions for Materials Listed Above		K. Handling Codes for Wastes Listed Above			
		a. DI		b.	
		c.		d.	
15. Special Handling Instructions and Additional Information 24 Hour Emergency Response Telephone No.: CHEMTREC 1-800-424-9300 DOT ERG 171 WEAR PROTECTIVE EQUIPMENT Invoice # 805769 Sales Order # 9653144					
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.					
Printed/Typed Name MERVIN ALLEY		Signature <i>m. alley</i>		Month Day Year 1 1 0 8 0 1	
17. Transporter 1 Acknowledgement of Receipt of Materials Printed/Typed Name DAVID S. HOYTRESS		Signature <i>[Signature]</i>		Month Day Year 1 1 0 8 0 1	
18. Transporter 2 Acknowledgement of Receipt of Materials Printed/Typed Name		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19. Printed/Typed Name Pete Thompson					
		Signature <i>Pete Thompson</i>		Month Day Year 1 1 0 8 0 1	

DO NOT WRITE BELOW THIS LINE.

Yellow

TSDF SENDS THIS COPY TO GENERATOR WITHIN 30 DAYS
Generators who submit hazardous waste or imminent threat waste manifests completed copy of this copy and send it back within 30 days

County of Marin Department of Public Works
Office of Waste Management
P.O. Box 4186, Room 404 Civic Center
San Rafael, CA 94913-4186
Phone (415) 499-6647 FAX (415) 499-3724

Permit to Remove an Underground Storage Tank System
Or
Temporary Closure of a Underground Storage Tank System

Site Information

Contractor Information

Name: US Army Reserve East Fort Baker			Name: Geofon Incorporated		
Address: Bldg. 699 Sommerville Rd.			Address: 65 Quinta Ct.		
City: Sausalito	State: CA	Zip: 94965	City: Sacramento	State: CA	Zip: 95823
Contact Name:	Phone: 289-7411		Contact Name:	Phone: (916)681-3601	

Number of Tank Systems To Be Closed: 1

Tank Size: 75-100 gallon UST

PURSUANT TO TITLE 26, CALIFORNIA CODE OF REGULATIONS, PERMISSION IS GRANTED TO REMOVE UNDERGROUND STORAGE TANKS AT THE ABOVE LOCATION WITH THE FOLLOWING CONDITIONS:

1. All stored material to be removed.
2. Tank purged of flammable vapors.
3. Proper disposal of the tank.
4. Marin County Office of Waste Management to be contacted 48 hours prior to removal.
5. Soil and/or water samples required. If necessary, unauthorized release forms must be mailed to Marin County Office of Waste Management.
6. Check with the local fire department for their requirements.
7. **This permit is valid for nine months from this date.**
8. Tank rinsate and soil contamination must be manifested for proper disposal.

Signed


Tim Underwood
Supervising R.E.H.S.

Date of Issuance: September 11, 2000

Post-It® Fax Note	7671	Date	# of pages
To Robert		From Tim Underwood	
Co./Dupl.		Co.	
Phone #		Phone #	
Fax #		Fax #	

APPENDIX C

CHEMICAL DATA

CHROMATOGRAM STANDARDS

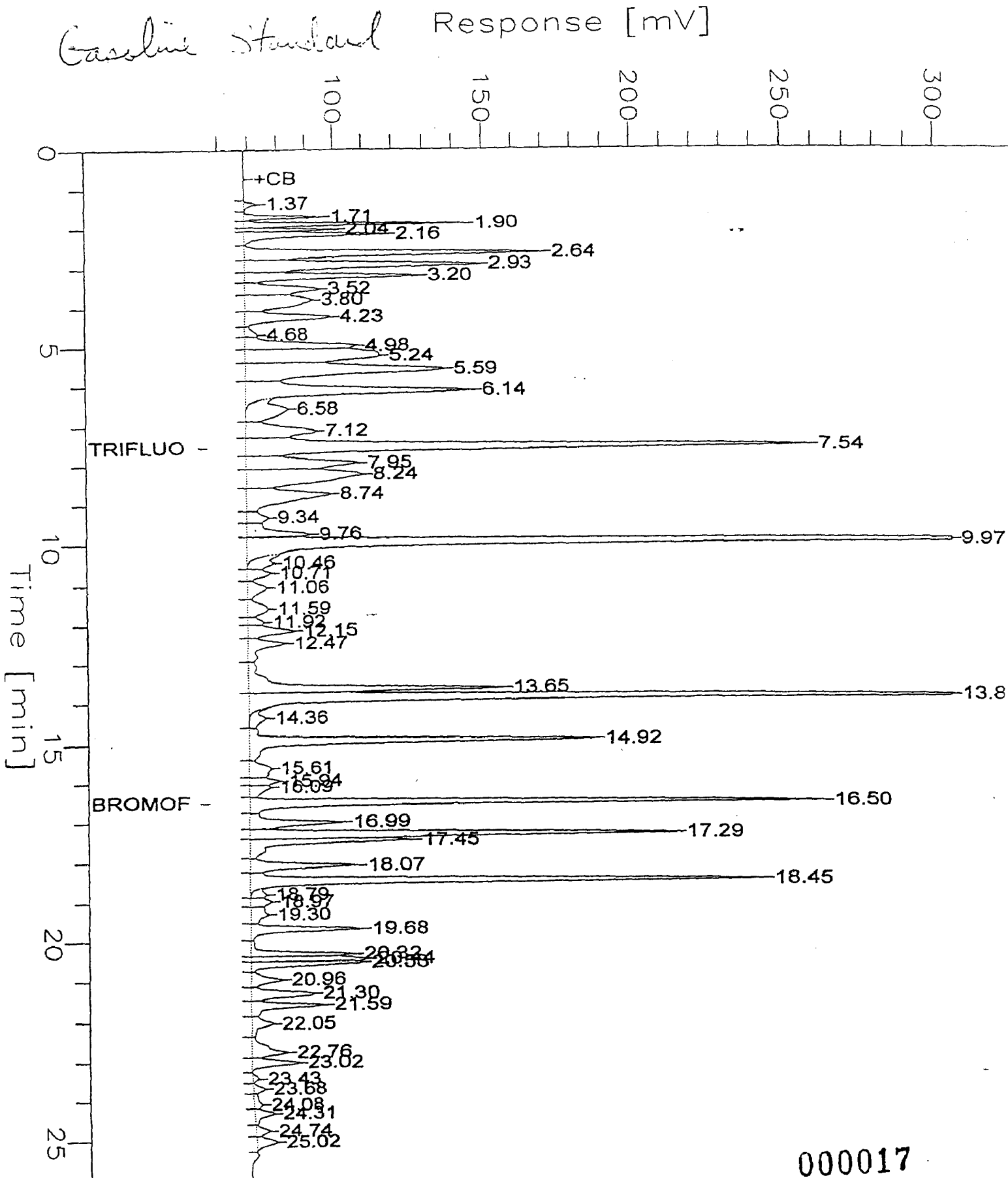
GC04 TVH 'J' Data File Rtx1FID

Sample Name : CCV/LCS, QC125083, 58274, 00WS9465, 5/5000
Sample Name : G:\GC04\DATA\257J003.raw
Method : TVHBTXE
Start Time : 0.00 min
Scale Factor : -1.0

End Time : 26.00 min
Plot Offset : 56 mV

Sample #: GAS
Date : 9/13/00 09:15 PM
Time of Injection: 9/13/00 08:49 PM
Low Point : 56.27 mV
Plot Scale: 250.0 mV

Page 1 of 1



Chromatogram

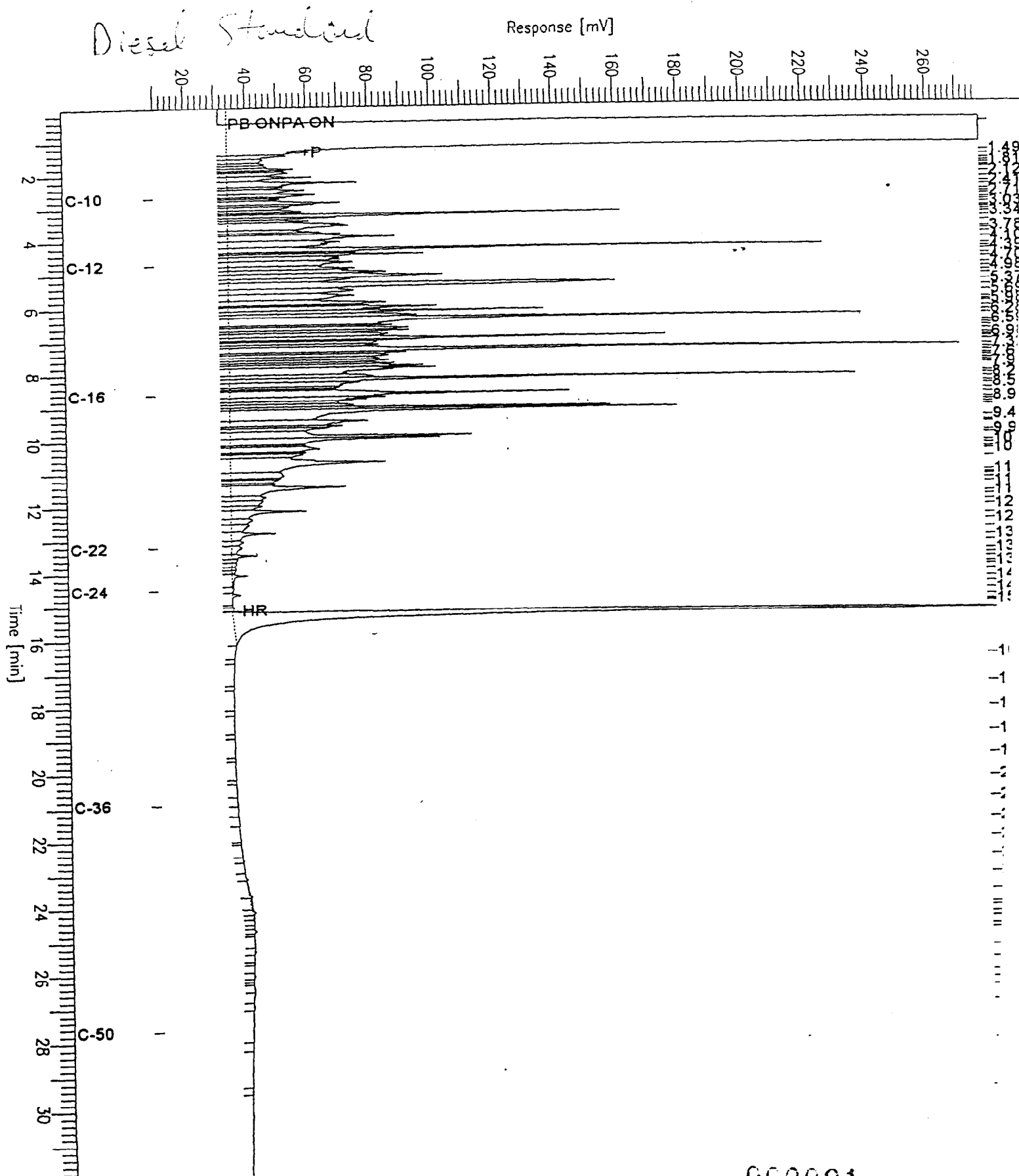
Sample Name : ccv,00ws9475,ds1
File Name : G:\GC15\CHS\226B002.RAW
Method : BTEH216.MTH
Start Time : 0.01 min
Scale Factor : 0.0

End Time : 31.91 min
Plot Offset : 10 mV

Sample #: 500mg/l
Date : 08/13/2000 12:52 PM
Time of Injection: 08/13/2000 12:15 PM
Low Point : 9.79 mV
Plot Scale: 267.9 mV

Page 1 of 1

High Point : 277.71 mV



000021

Chromatogram

Sample Name : ccv,00ws9673.mo
FileName : G:\GC15\CHB\259B002.RAW
Method :
Start Time : 0.01 min
Scale Factor : 0.0

End Time : 31.91 min
Plot Offset: 20 mV

Sample #: 500mg/l

Date : 09/20/2000 05:58 PM

Time of Injection: 09/15/2000 11:00 AM

Low Point : 19.65 mV

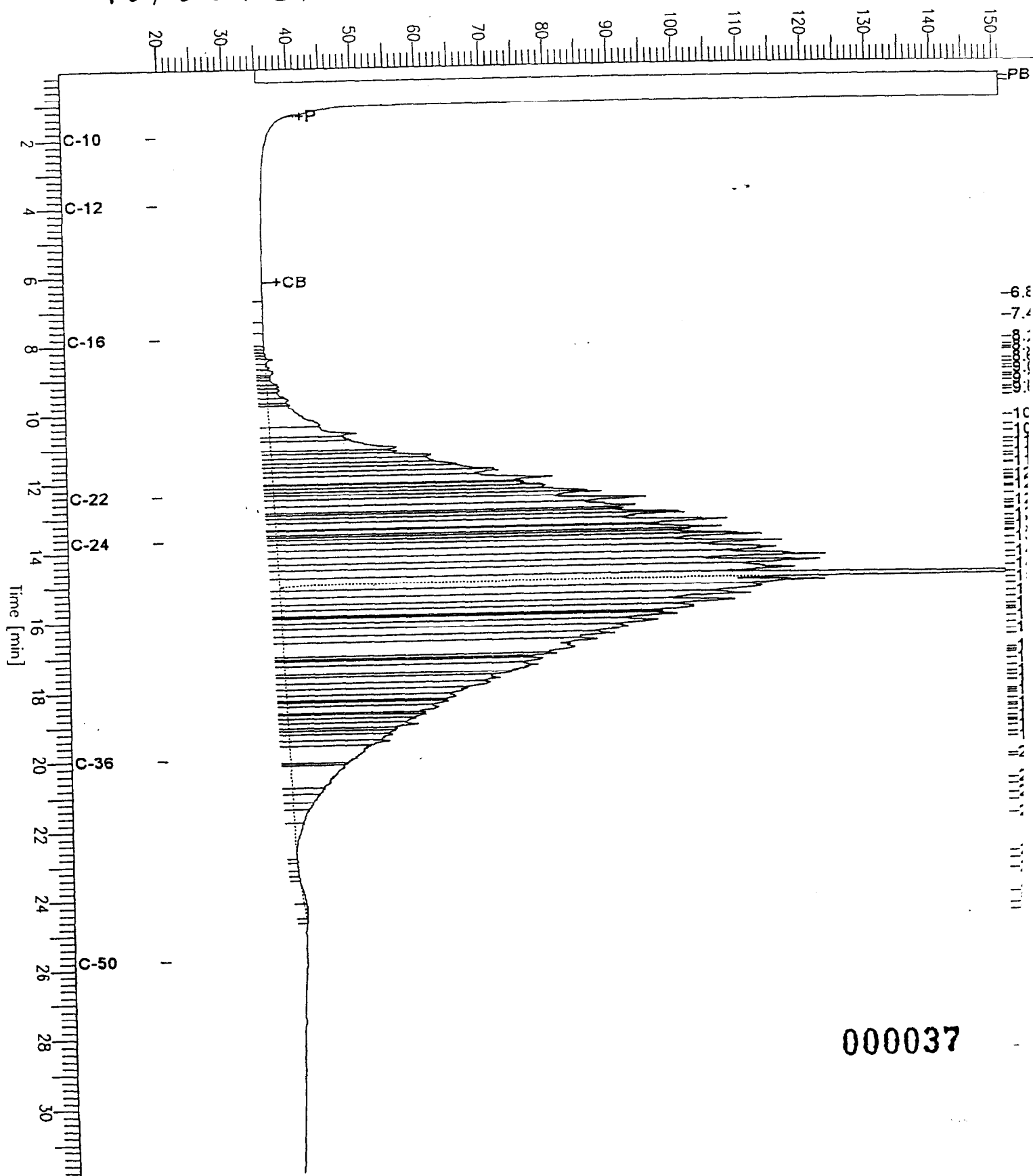
Plot Scale: 131.4 mV

Page 1 of 1

High Point : 151.03 mV

Motor 0:1 Standard

Response [mV]



BUILDING 637 AST CHROMATOGRAMS

Chromatogram

Sample Name : 146977-005sg,57634

FileName : G:\GC15\CHB\2260047.RAW

Method : BTEH216.MTH

Start Time : 0.01 min

Scale Factor: 0.0

End Time : 31.91 min

Plot Offset: -20 mV

Sample #: 57634

Date : 08/15/2000 09:30 AM

Time of Injection: 08/15/2000 12:37 AM

Low Point : -20.26 mV

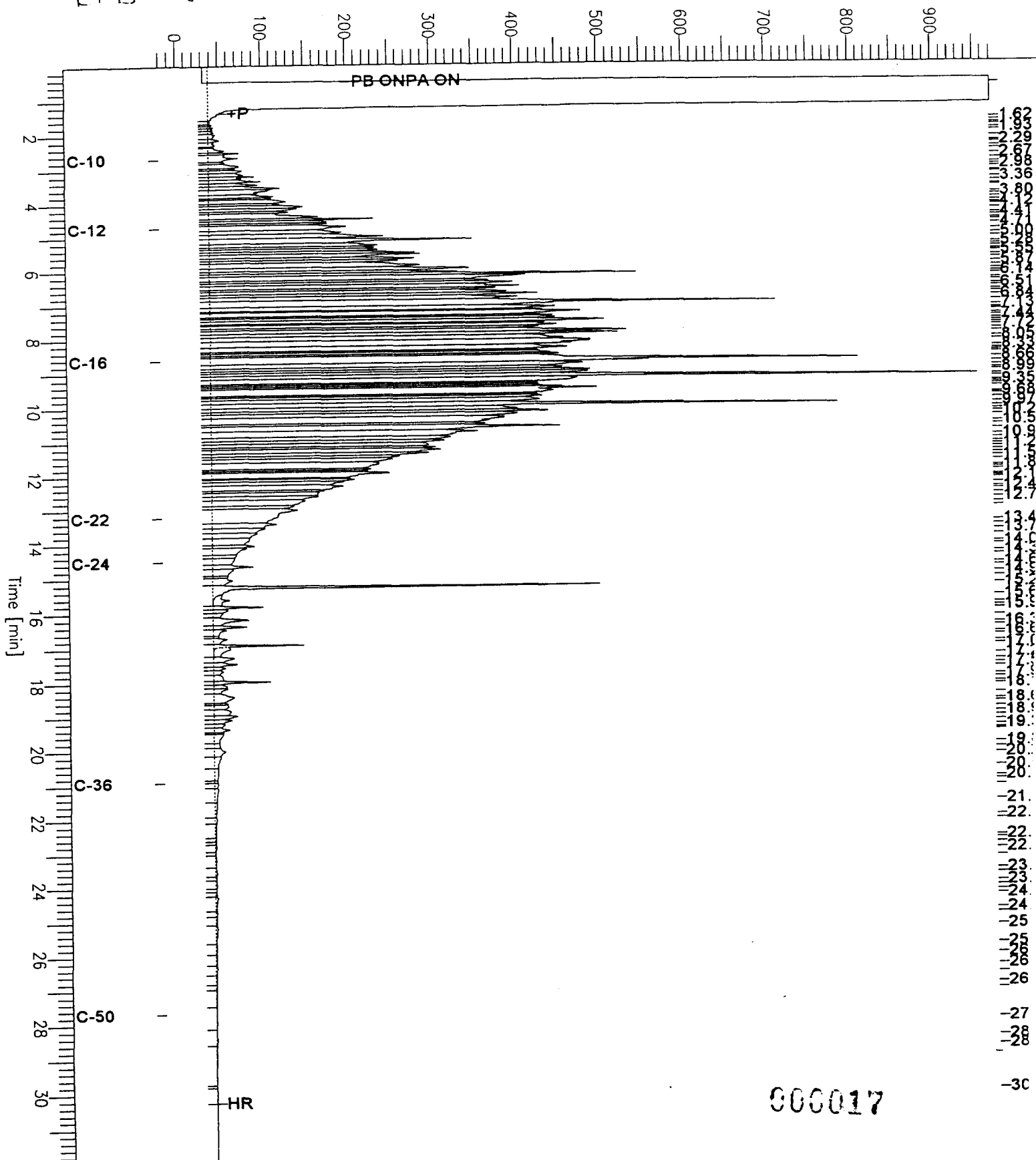
Plot Scale: 990.7 mV

Page 1 of 1

High Point : 970.46 mV

EFB-AST637-SB6-10

Response [mV]



000017

-3C

Chromatogram

Sample Name : 146977-007sg, 57634

FileName : G:\GC15\CHB\226B060.RAW

Method : BTEH216.MTH

Start Time : 0.01 min

Scale Factor: 0.0

End Time : 31.91 min

Plot Offset: -20 mV

Sample #: 57634

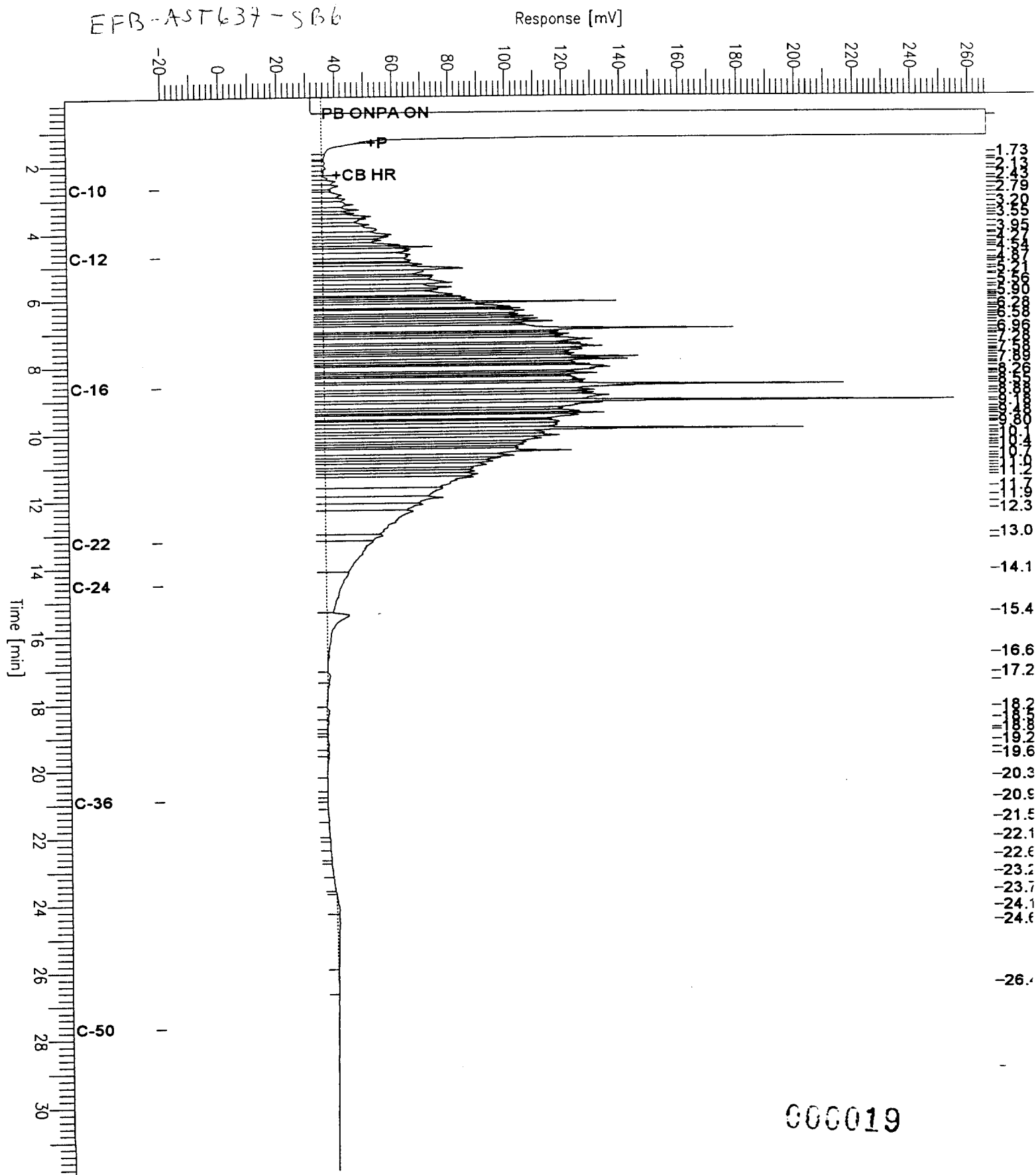
Date : 08/15/2000 11:02 AM

Time of Injection: 08/15/2000 09:55 AM

Low Point : -20.47 mV

Plot Scale: 287.0 mV

Page 1 of 1



000019

Chromatogram

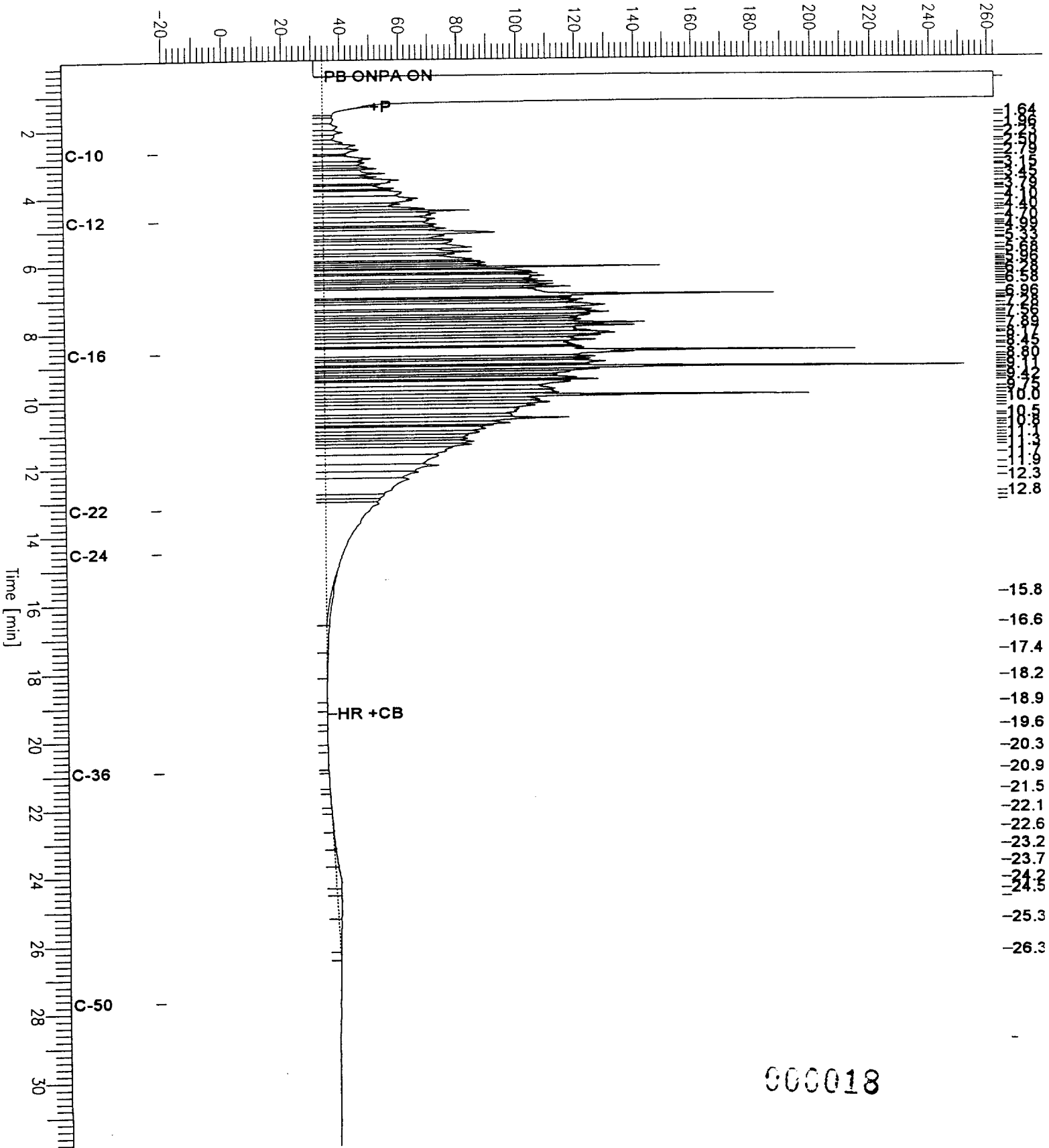
Sample Name : 146977-006sg,57634
 FileName : G:\GC15\CHB\226961.RAW
 Method : BTEH216.MTH
 Start Time : 0.01 min
 Scale Factor : 0.0

End Time : 31.91 min
 Plot Offset: -21 mV

Sample #: 57634
 Date : 08/15/2000 11:19 AM
 Time of Injection: 08/15/2000 10:38 AM
 Low Point : -21.28 mV
 Plot Scale: 283.4 mV
 High Point : 262.12 mV

EFB-AST637 - SB7-4

Response [mV]



Chromatogram

Sample Name : 146977-002sg,57634
FileName : G:\GC15\CHB\2266031.RAW
Method : BTEH216.MTH
Start Time : 0.01 min
Scale Factor: 0.0

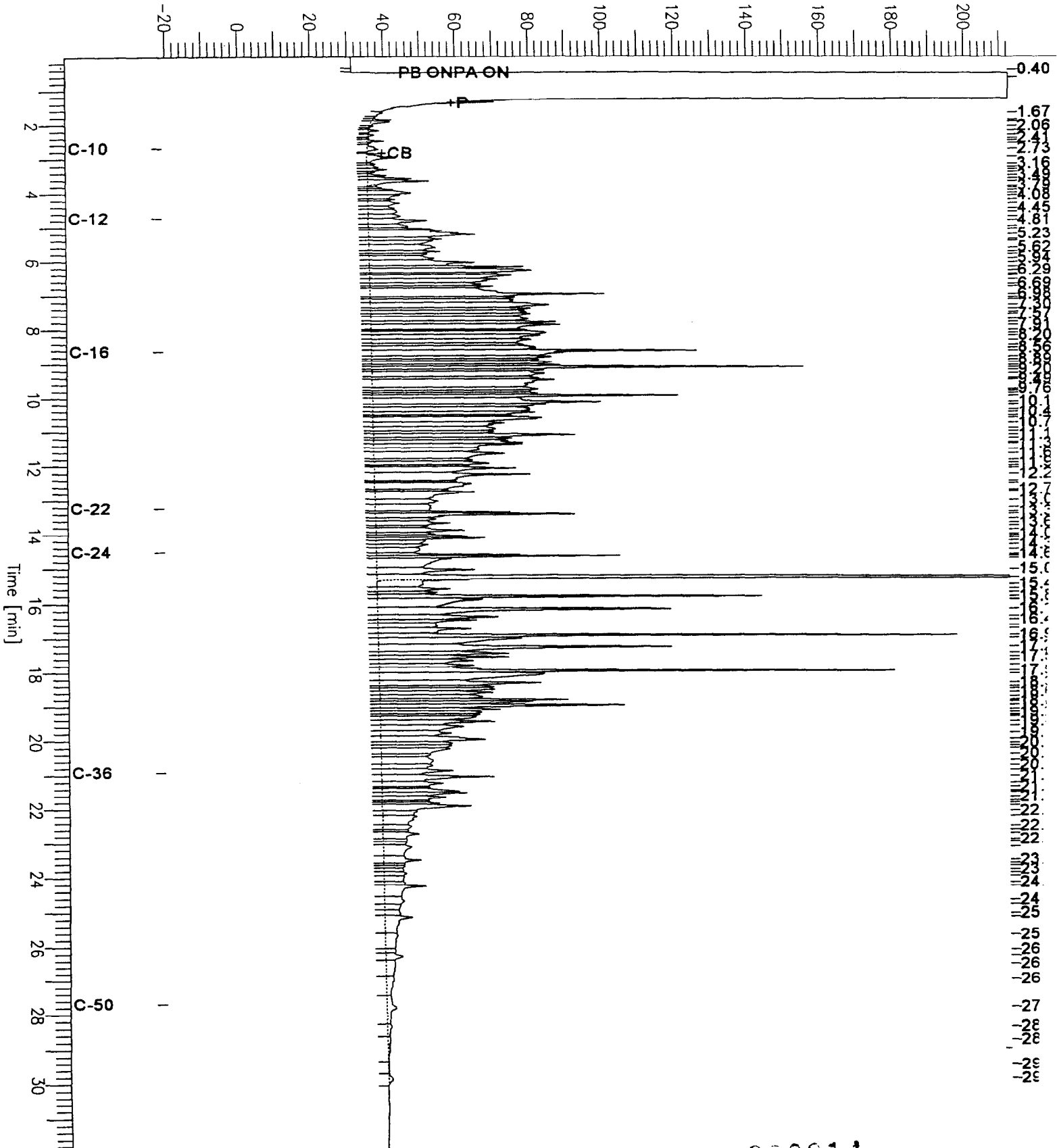
End Time : 31.91 min
Plot Offset: -21 mV

Sample #:
Date : 08/14/2000 03:15 PM
Time of Injection: 08/14/2000 01:10 PM
Low Point : -20.99 mV
Plot Scale: 233.5 mV

Page 1 of 1

EFB-AST637-SG8-6.5

Response [mV]



000014

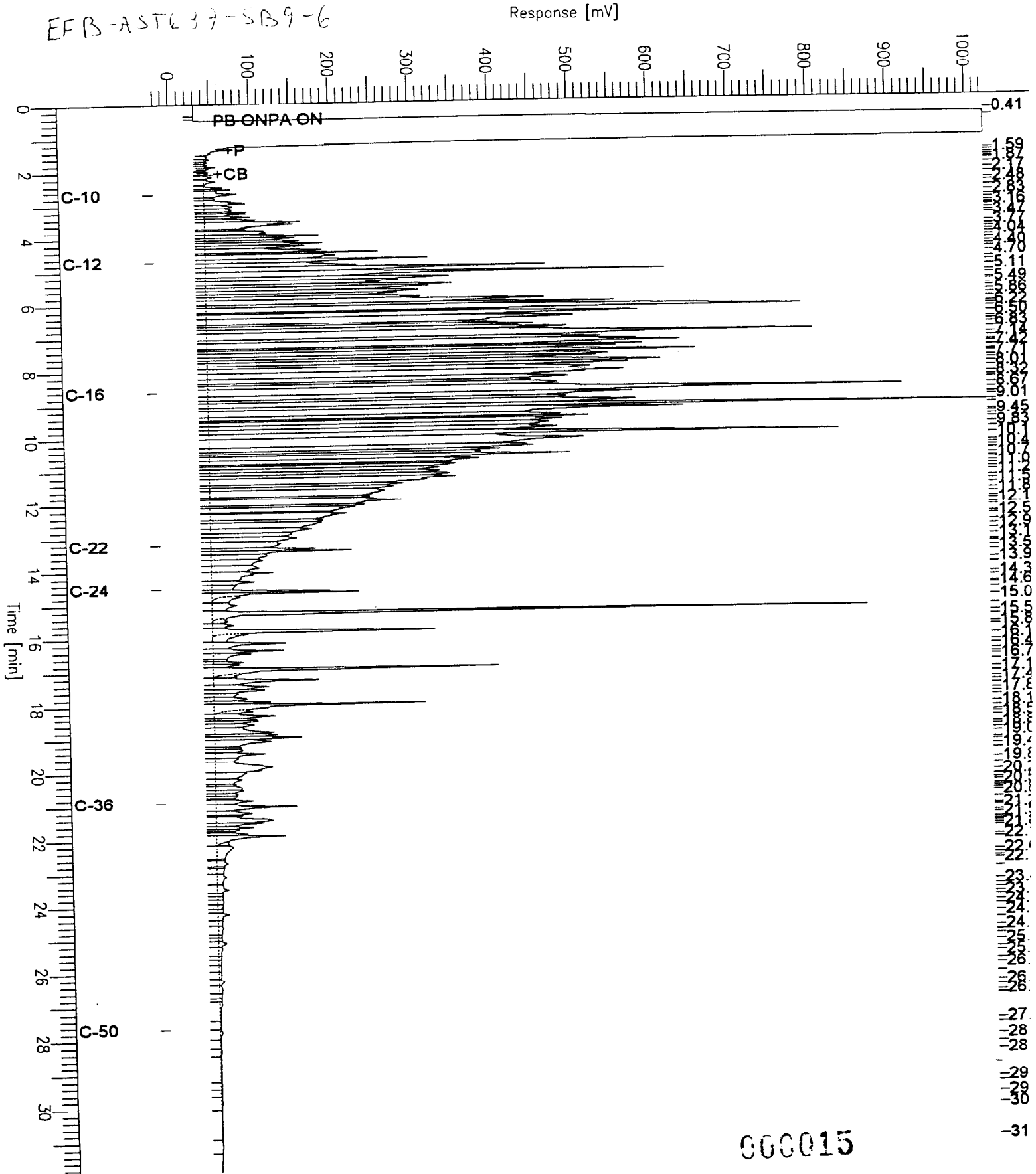
Chromatogram

Sample Name : 146977-003sg,57634
FileName : G:\GC15\CHB\2268032.RAW
Method : BTEH216.MTH
Start Time : 0.00 min
Scale Factor: 0.0

End Time : 31.90 min
Plot Offset: -21 mV

Sample #:
Date : 08/14/2000 03:15 PM
Time of Injection: 08/14/2000 01:52 PM
Low Point : -21.43 mV
Plot Scale: 1045.4 mV

Page 1 of 1



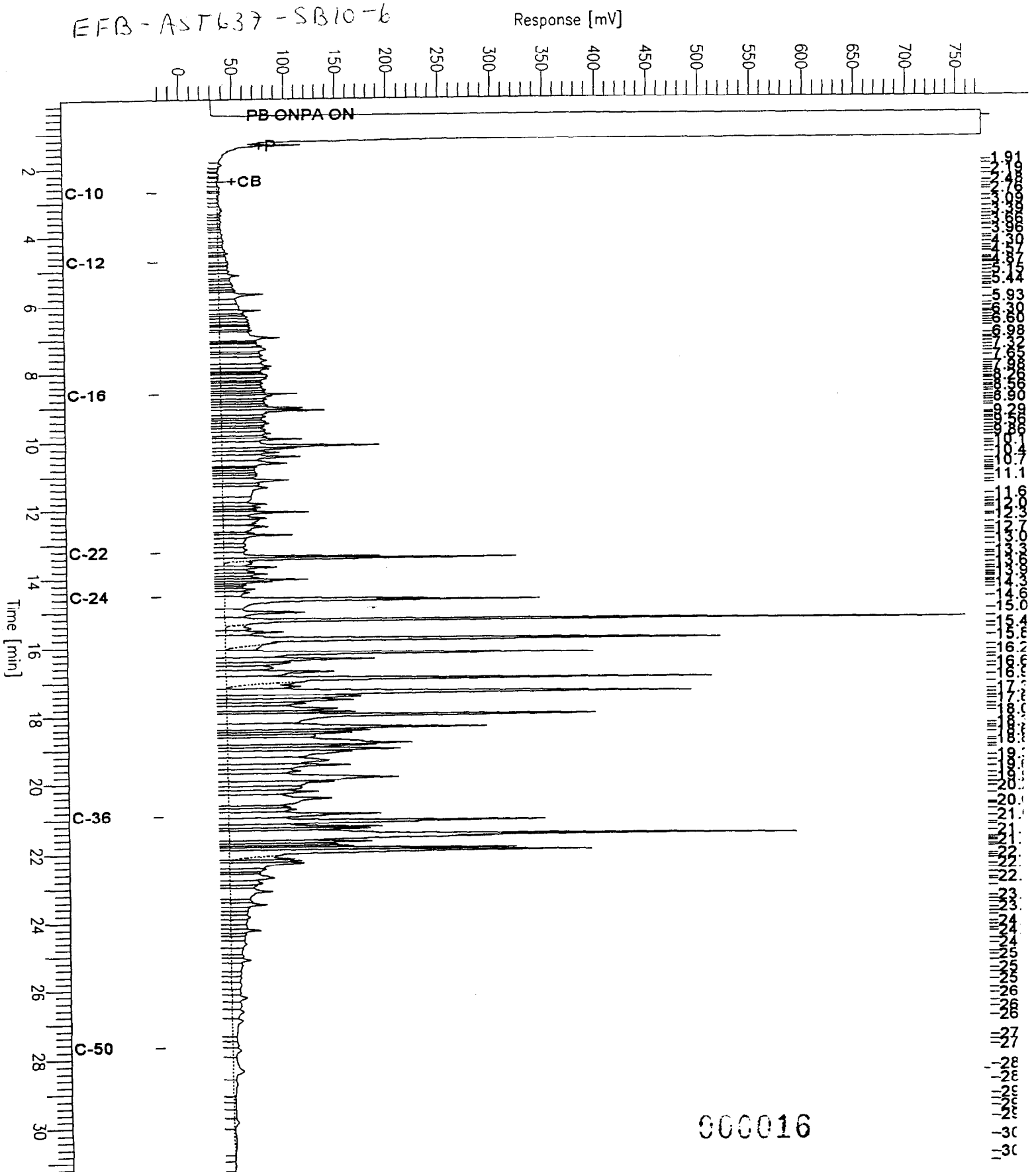
Chromatogram

Sample Name : 146977-004sg,57634
FileName : G:\GC15\CHB\226B064.RAW
Method : BTEH216.MTH
Start Time : 0.01 min
Scale Factor: 0.0

End Time : 31.27 min
Plot Offset: -22 mV

Sample #: 57634
Date : 08/15/2000 01:45 PM
Time of Injection: 08/15/2000 12:56 PM
Low Point : -21.82 mV
Plot Scale: 796.9 mV
High Point : 775.03 mV

Page 1 of 1



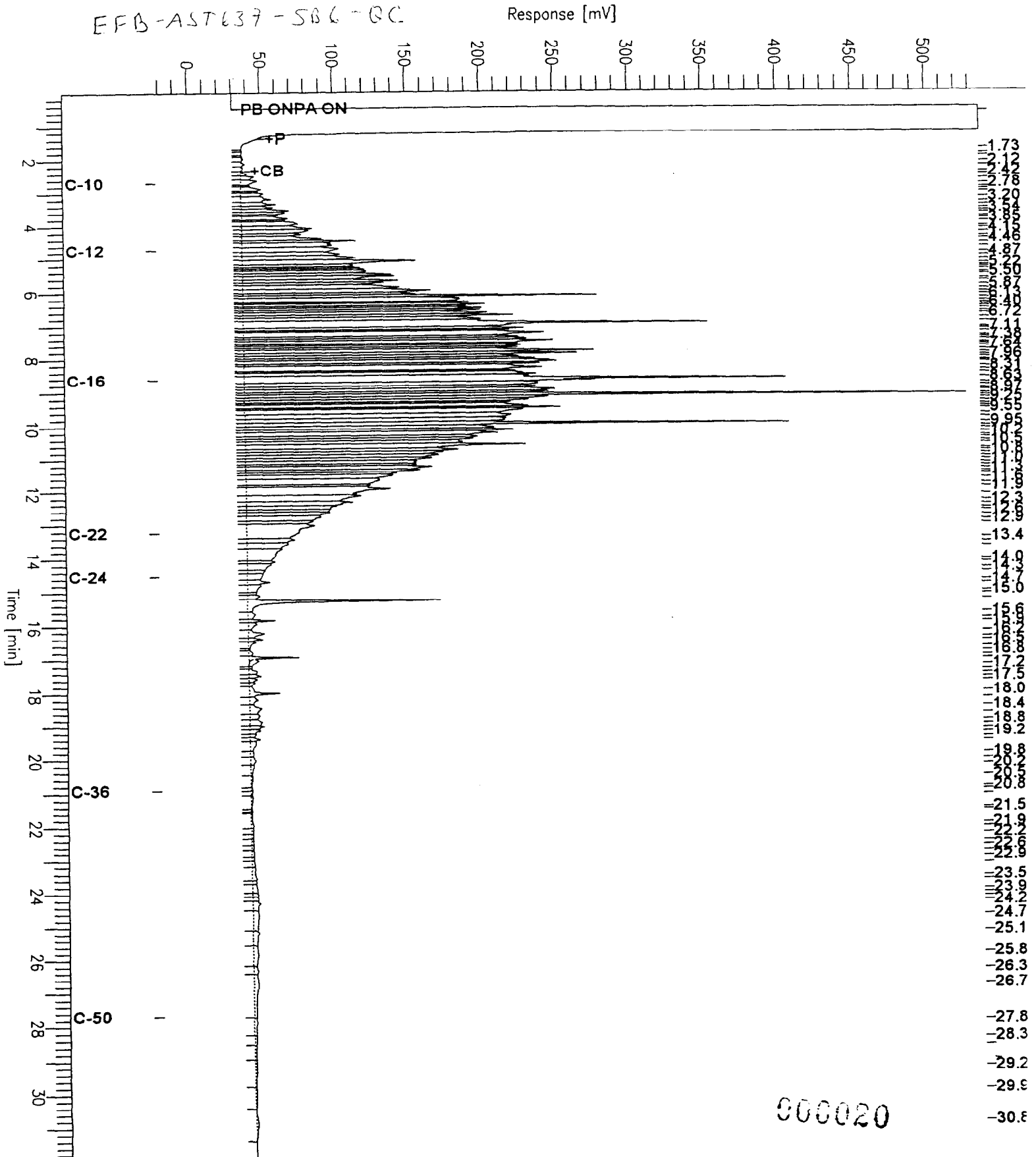
Chromatogram

Sample Name : 146977-008sg,57677
Sample Name : G:\GC15\CHB\226B008.RAW
Method : BTEH216.MTH
Start Time : 0.01 min
Scale Factor: 0.0

End Time : 31.91 min
Plot Offset: -22 mV

Sample #: 57677
Date : 08/16/2000 11:45 AM
Time of Injection: 08/15/2000 04:47 PM
Low Point : -21.66 mV
Plot Scale: 559.2 mV
High Point : 537.49 mV

Page 1 of 1



Chromatogram

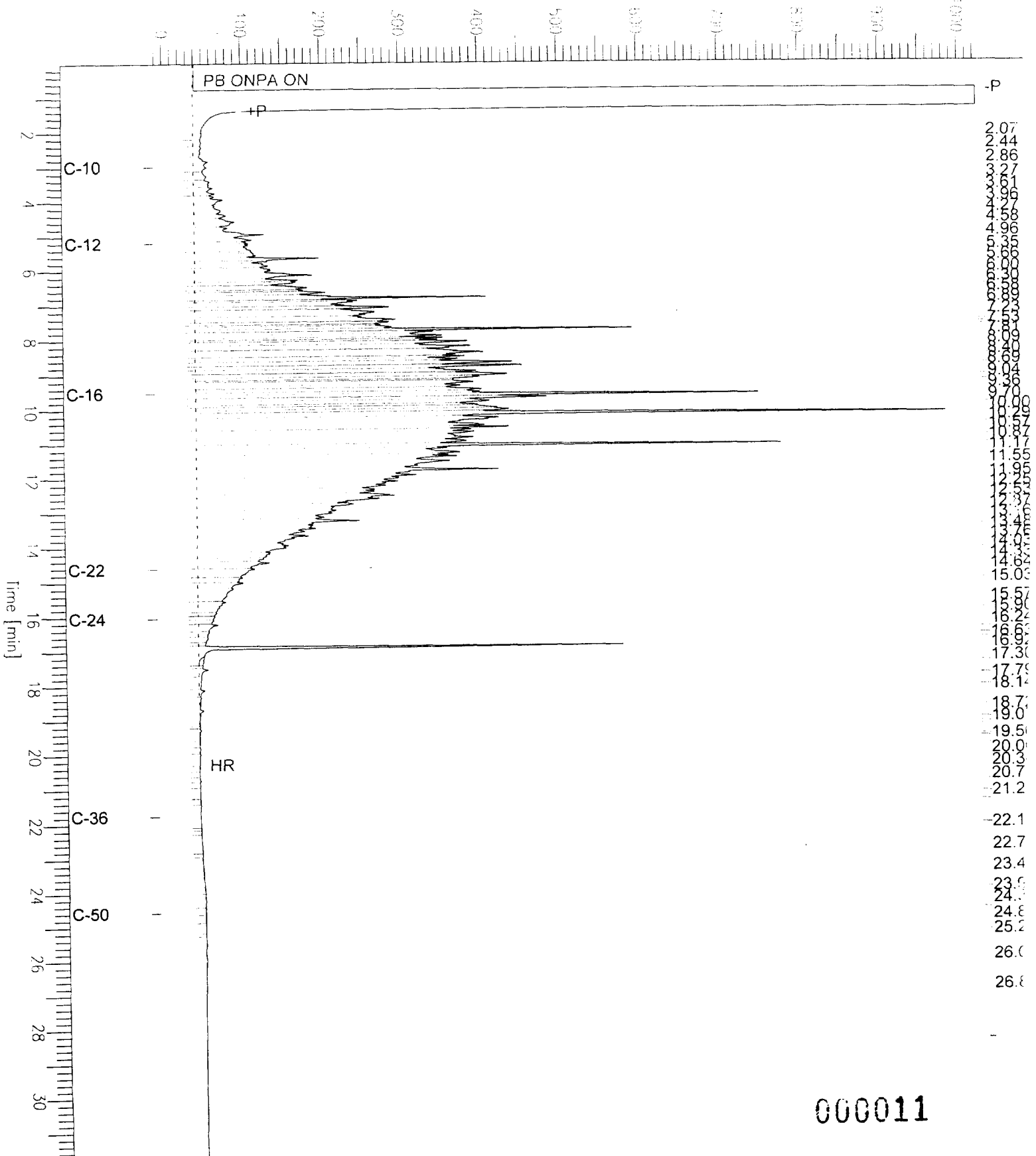
Sample Name : 147007-001sg,57641
 FileName : G:\GC11\CHA\233A027.RAW
 Method : ATEH234.MTH
 Start Time : 0.01 min
 Scale Factor: 0.0

End Time : 31.91 min
 Plot Offset: -12 mV

Sample #: 57641
 Date : 8/21/00 11:14 AM
 Time of Injection: 8/21/00 10:32 AM
 Low Point : -12.22 mV
 Plot Scale: 1036.2 mV
 High Point : 1024.00 mV

EFB-AST637-SW1

Response [mV]



000011

Chromatogram

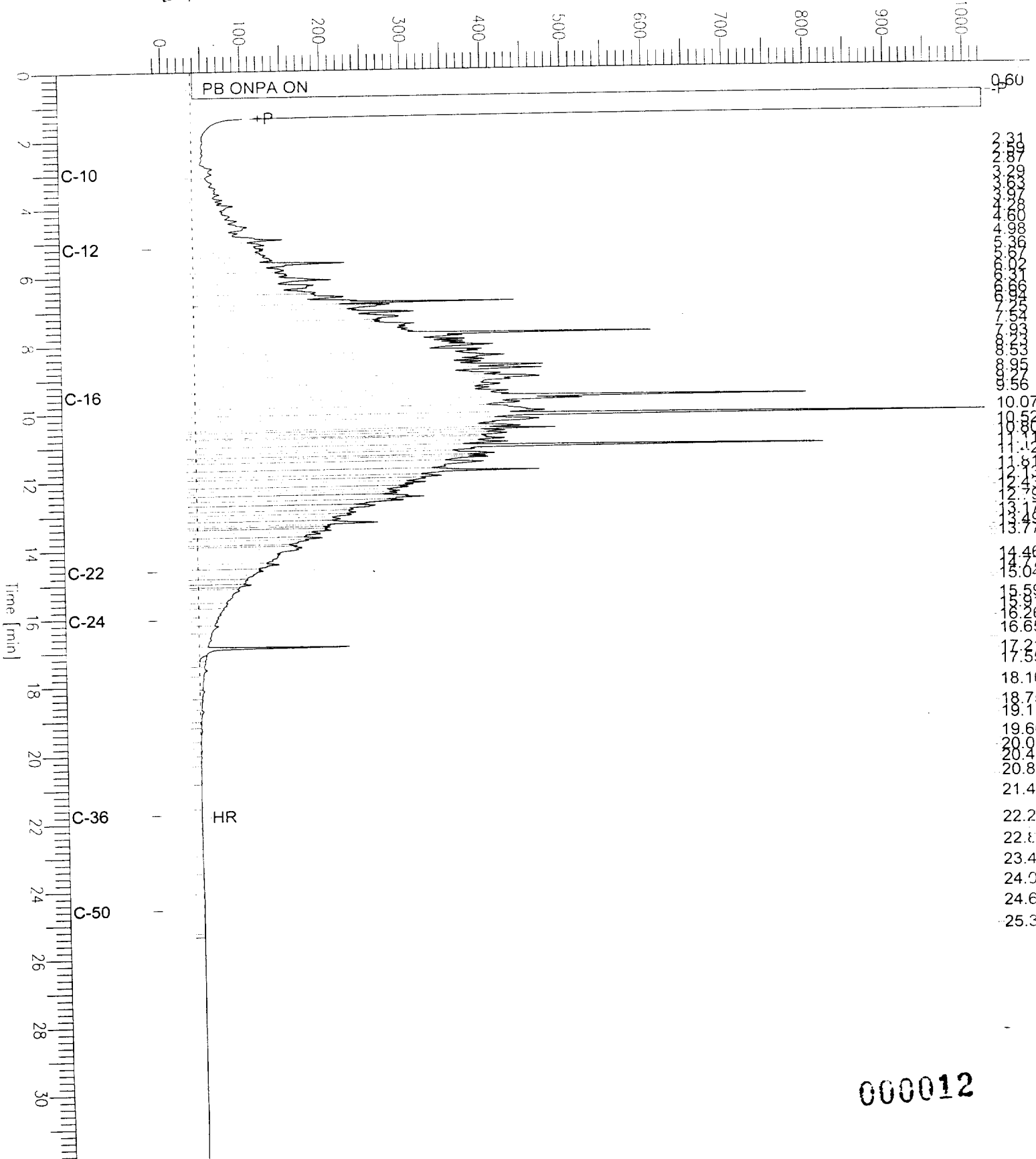
Sample Name : 147007-002sg,57641
 FileName : G:\GC11\CHA\231A026.RAW
 Method : ATEH230.MTH
 Start Time : 0.00 min
 Scale Factor: 0.0

End Time : 31.90 min
 Plot Offset: -14 mV

Sample #: 57641
 Date : 8/20/00 03:34 PM
 Time of Injection: 8/19/00 10:33 AM
 Low Point : -14.15 mV
 High Point : 1024.00 mV
 Plot Scale: 1038.2 mV

Page 1 of 1

EFB-AST637-SW1-2C Response [mV]



000012

BUILDING 699 UST CHROMATOGRAMS

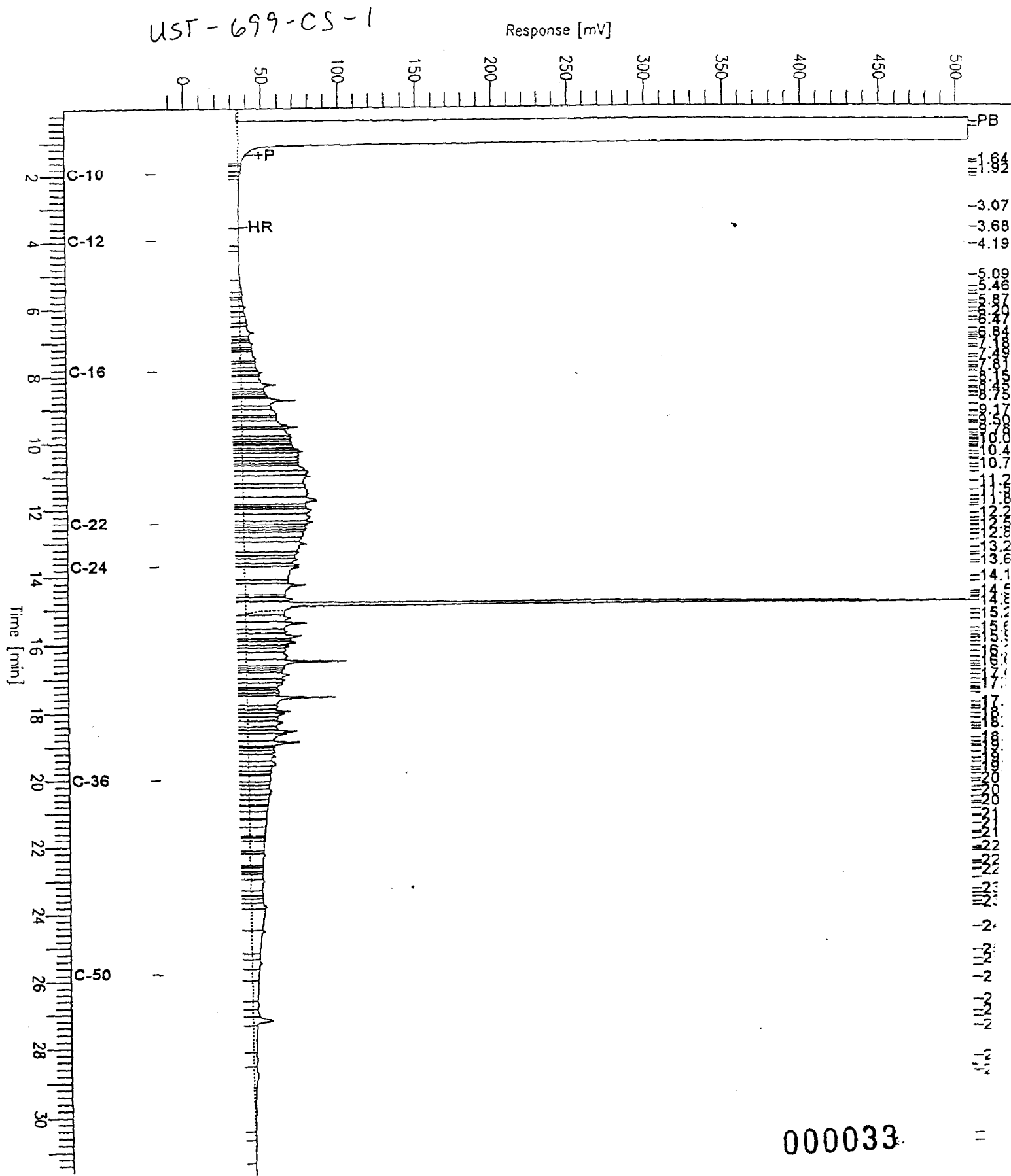
Chromatogram

Sample Name : 147503-001sg, 58303
 FileName : G:\GC15\CHB\2593041.RAW
 Method : BTEH258.MTH
 Start Time : 0.01 min
 Scale Factor: 0.0

End Time : 31.91 min
 Plot Offset: -18 mV

Sample #: 58303
 Date : 09/17/2000 03:19 PM
 Time of Injection: 09/16/2000 03:36 PM
 Low Point : -18.33 mV
 Plot Scale: 527.0 mV

Page 1 of 1



Chromatogram

Sample Name : 147505-002sg,58352

FileName : G:\GC15\CHB\262B034.RAW

Method : BTEH258.MTH

Start Time : 0.01 min

Scale Factor: 0.0

End Time : 31.84 min

Plot Offset: -19 mV

Sample #: 58352

Date : 09/19/2000 02:43 PM

Time of Injection: 09/19/2000 01:58 PM

Low Point : -19.07 mV

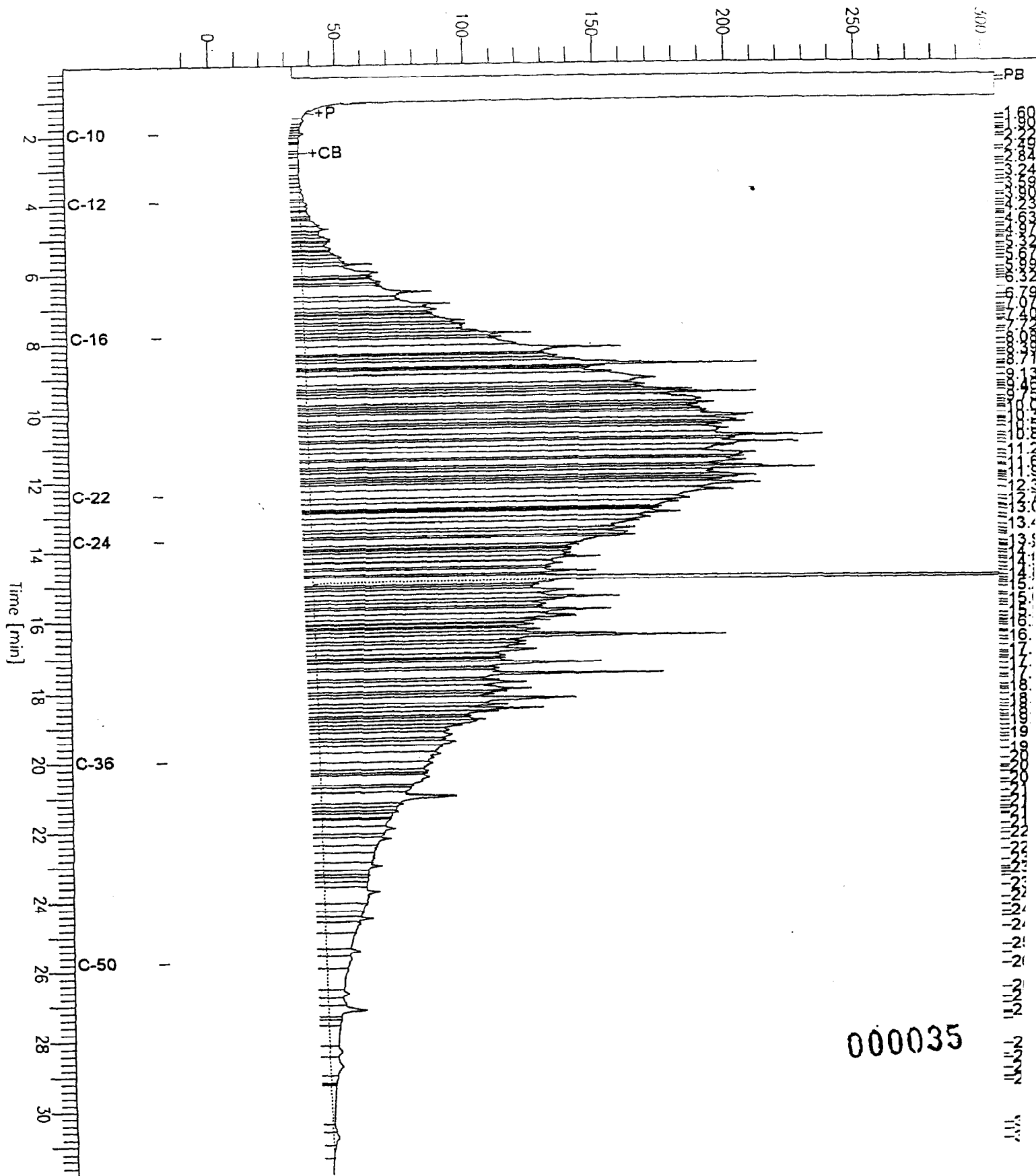
Plot Scale: 324.7 mV

Page 1 of 1

High Point : 305.66 mV

UST-699-CS-2

Response [mV]



000035

Chromatogram

Sample Name : 147505-003sg, 59303
FileName : G:\GC15\CHB\239B043.RAW
Method : BTEH258.MTH
Start Time : 0.01 min
Scale Factor: 0.0

End Time : 31.91 min
Plot Offset: -19 mV

Sample #: 59303

Date : 09/17/2000 03:20 PM

Time of Injection: 09/16/2000 05:03 PM

Low Point : -18.69 mV

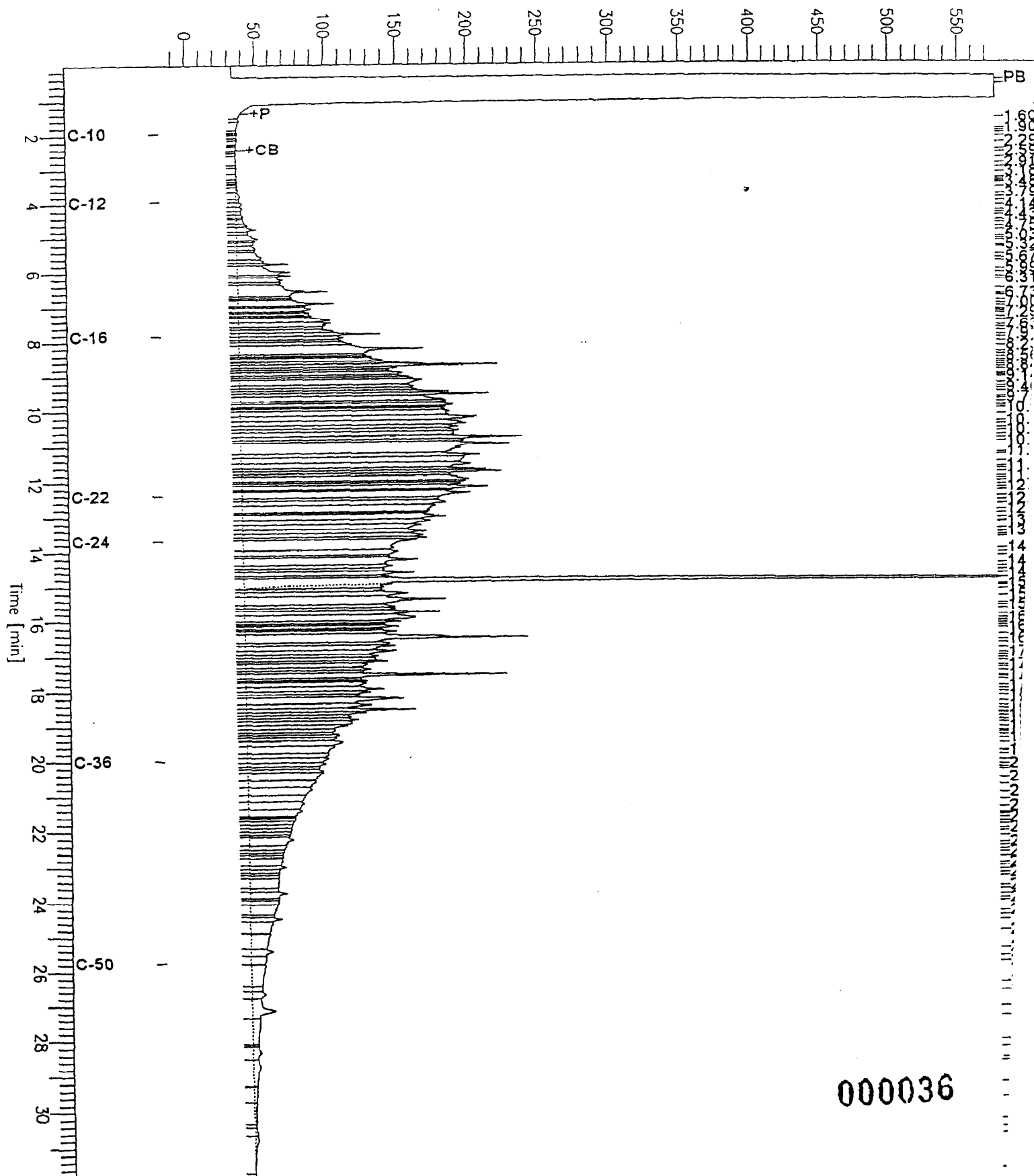
Plot Scale: 595.9 mV

Page 1 of 1

High Point : 577.18 mV

UST-699-CS-3

Response [mV]



000036

GC04 TVH 'J' Data File Rtx1FID

Sample Name : 147505-002,58274, tvh only

FileName : G:\GC04\DATA\257J022.raw

Method : TVH9IXE

Start Time : 0.00 min

Scale Factor: -1.0

End Time : 26.00 min

Plot Offset: 56 mV

Sample #: g

Date : 9/14/00 09:27 AM

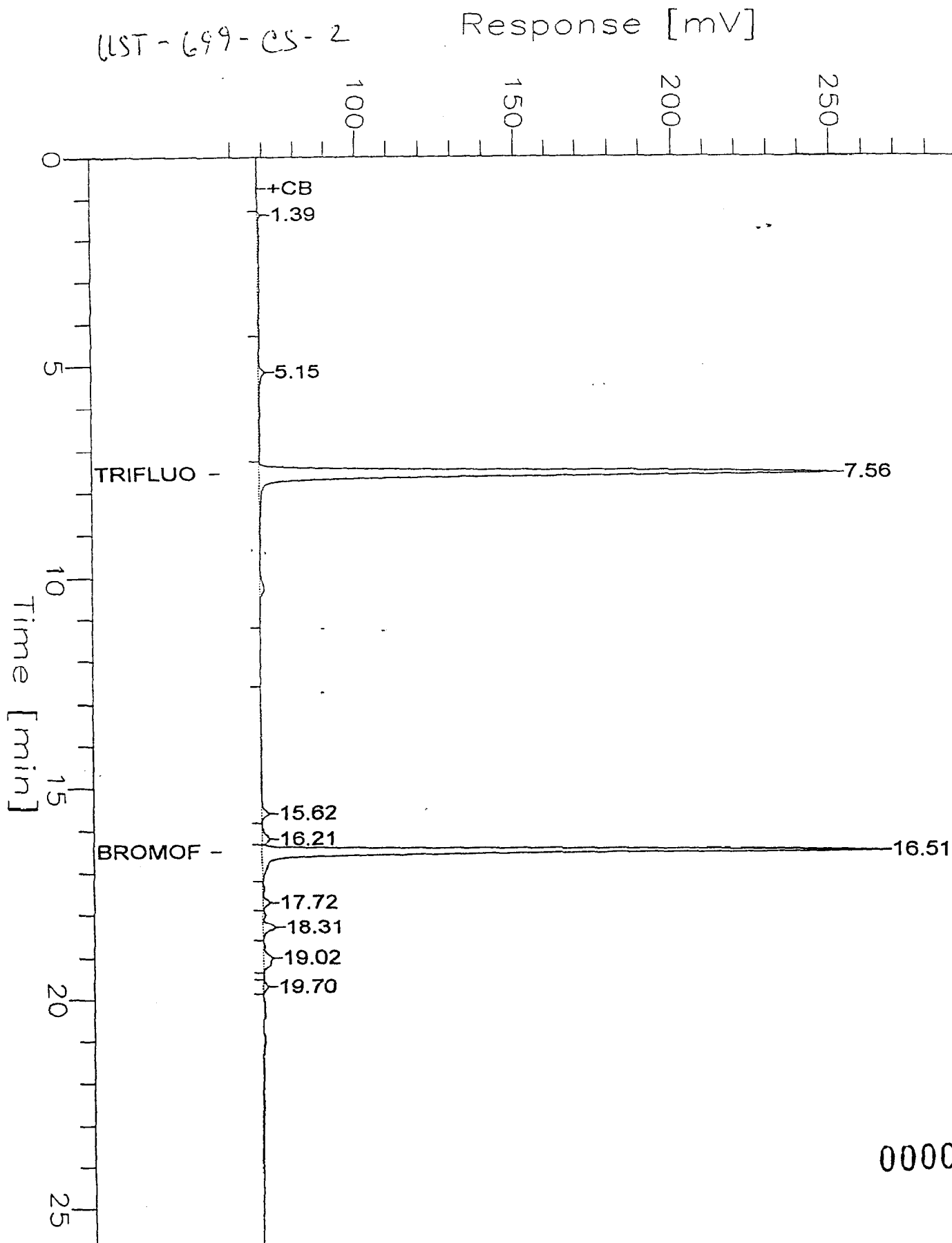
Time of Injection: 9/14/00 09:01 AM

Low Point : 55.87 mV

Plot Scale: 250.0 mV

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High Point : 305.87 mV



000016

FDS C-10 SITE CHROMATOGRAMS

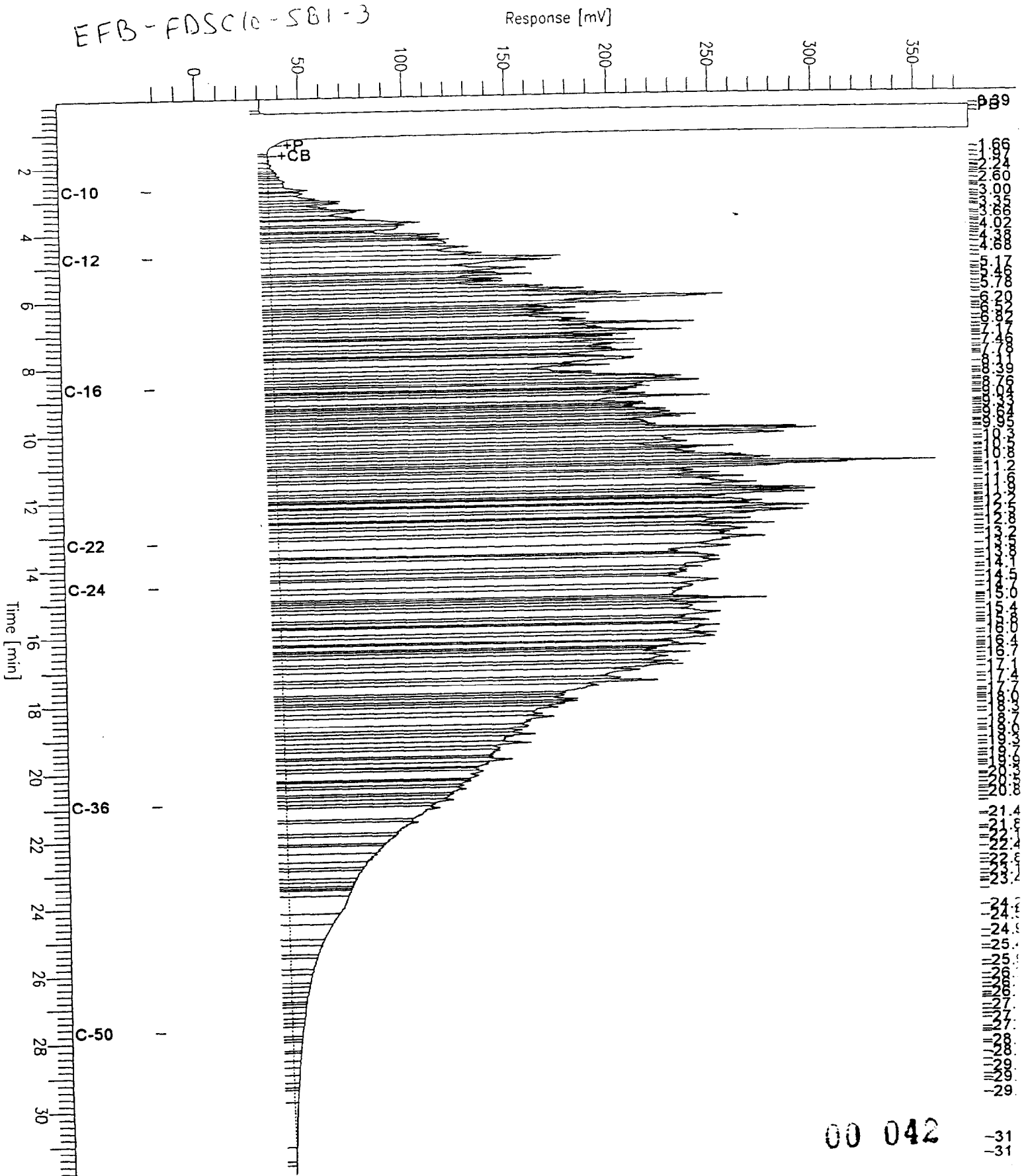
Chromatogram

Sample Name : 147111-006sg, 57828
FileName : G:\GC15\CHB\242B010.RAW
Method : BTEH236.MTH
Start Time : 0.01 min
Scale Factor: 0.0

End Time : 31.91 min
Plot Offset: -21 mV

Sample #: 57828
Date : 08/30/2000 10:59 AM
Time of Injection: 08/30/2000 12:21 AM
Low Point : -21.36 mV
Plot Scale: 398.2 mV
High Point : 376.83 mV

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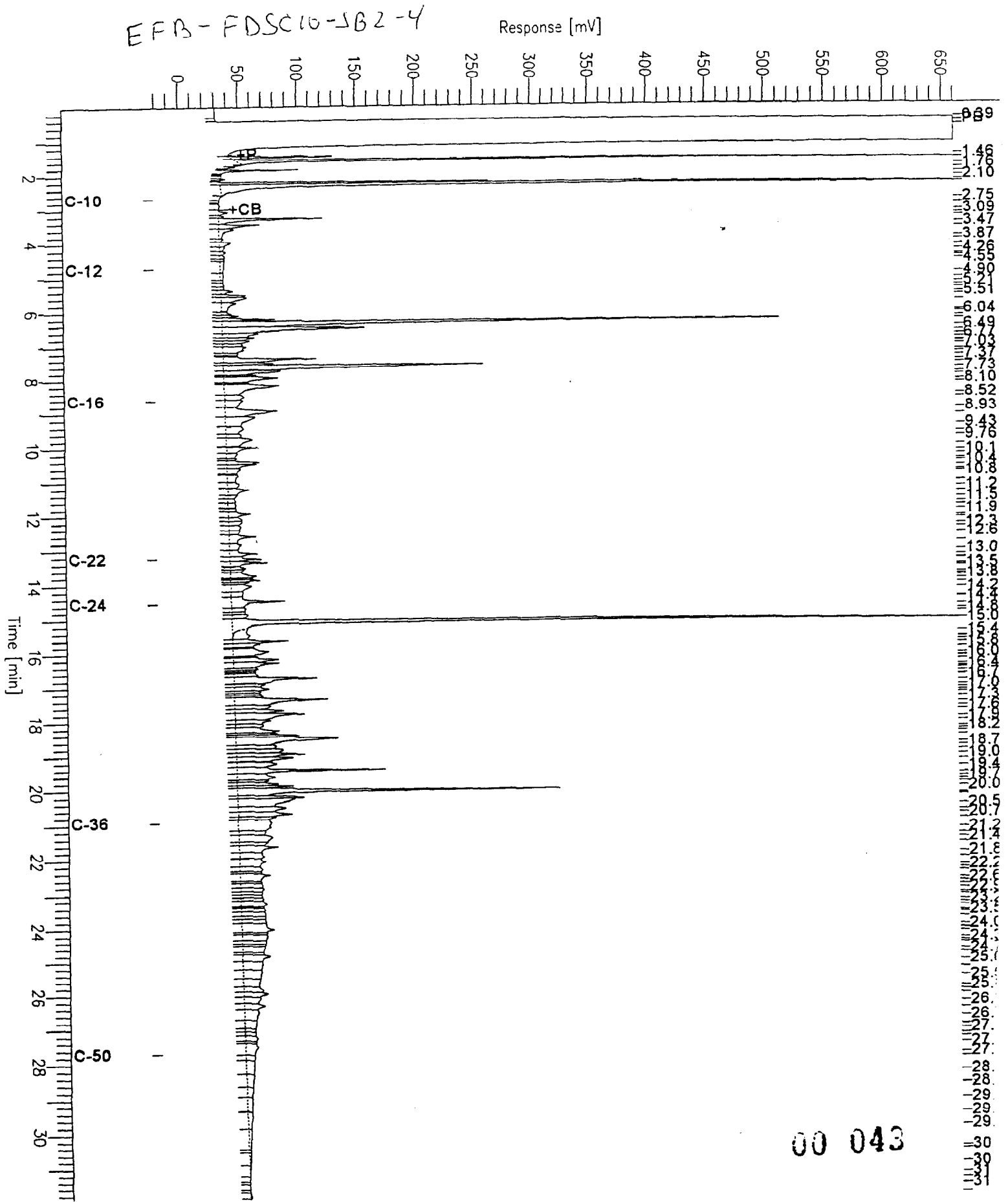
Chromatogram

Sample Name : 147111-007sq,57828
 FileName : G:\GC15\CHB\2385070.RAW
 Method : BTEH236.MTH
 Start Time : 0.01 min
 Scale Factor: 0.0

End Time : 31.91 min
 Plot Offset: -22 mV

Sample #: 57828
 Date : 08/29/2000 09:44 AM
 Time of Injection: 08/29/2000 05:42 AM
 Low Point : -21.52 mV
 Plot Scale: 681.8 mV
 High Point : 660.26 mV

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00 043

GC04 TVH 'J' Data File Rtx1FID

Sample Name : 147111-005, 57795 tvh only

FileName : G:\GC04\DATA\231J016.raw

Method : TVHBTXE

Start Time : 0.00 min

Scale Factor: -1.0

End Time : 26.00 min

Plot Offset: 59 mV

Sample #: c

Date : 8/21/00 01:08 PM

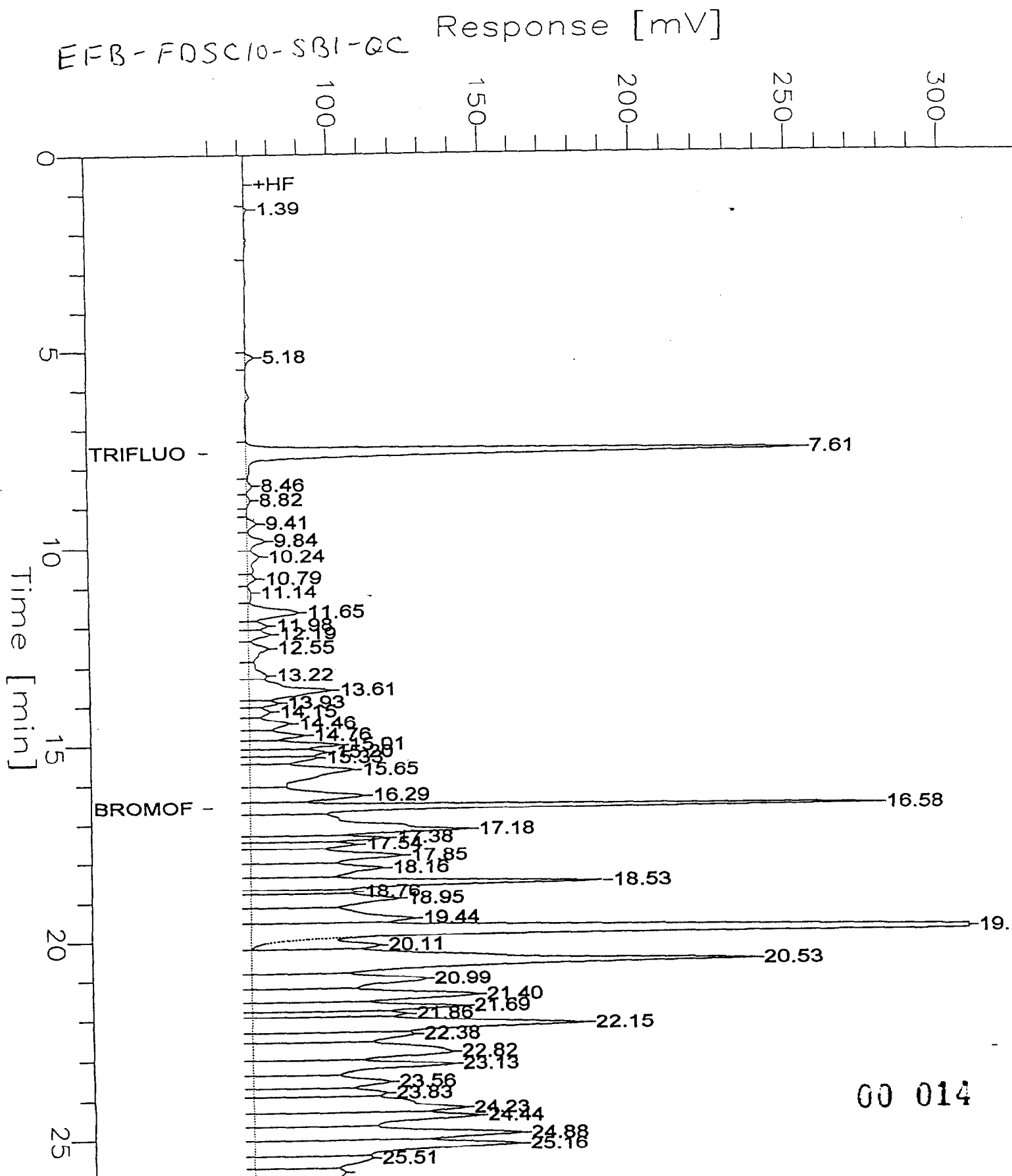
Time of Injection: 8/19/00 05:22 AM

Low Point : 59.02 mV

Plot Scale: 250.0 mV

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High Point : 309.02 mV



00 014

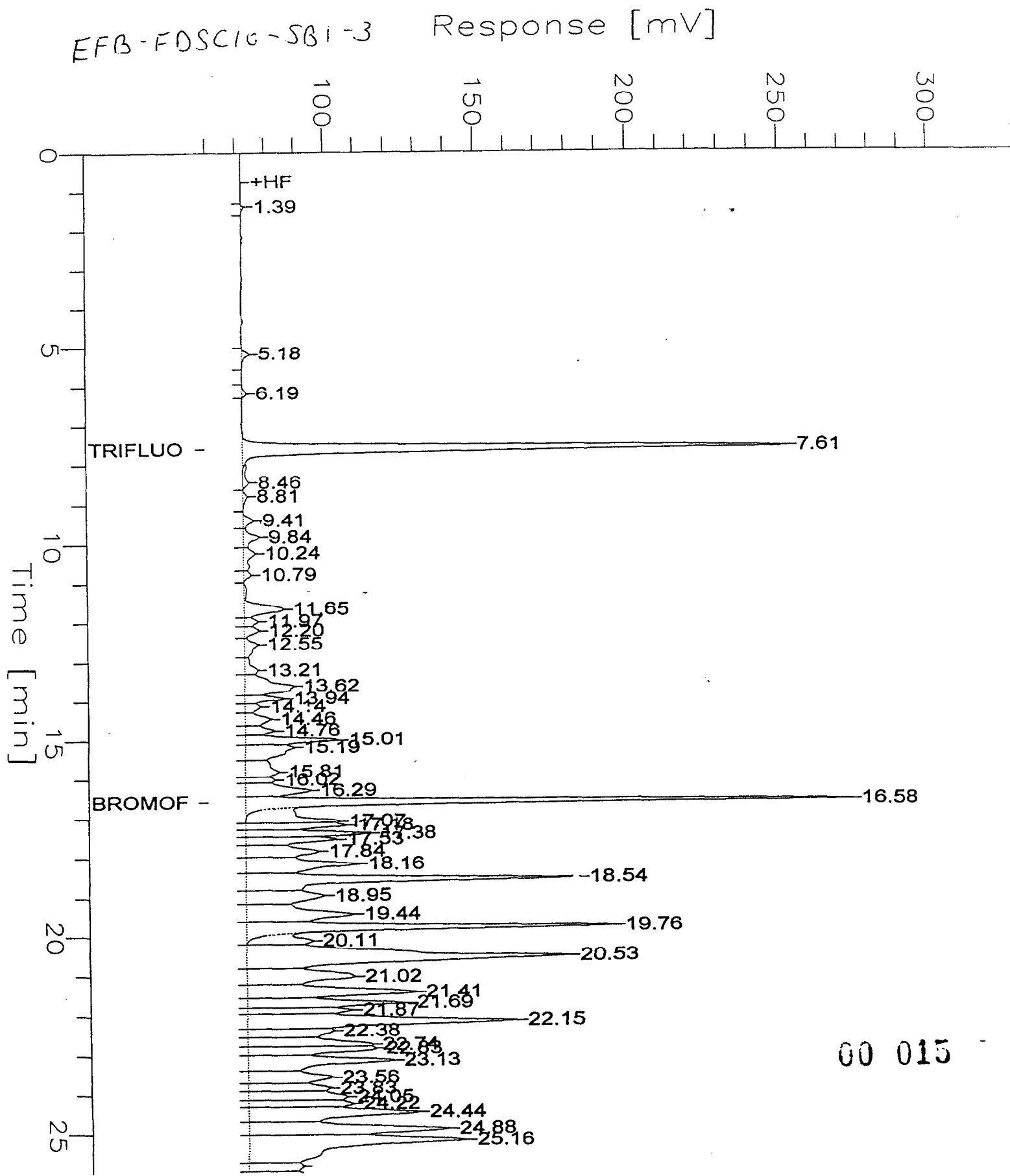
GC04 TVH 'J' Data File Rtx1FID

Sample Name : 147111-006,57795.tvh only
FileName : G:\GC04\DATA\231J017.raw
Method : TVHBTXE
Start Time : 0.00 min
Scale Factor: -1.0

End Time : 26.00 min
Plot Offset: 59 mV

Sample #: e
Date : 8/21/00 01:08 PM
Time of Injection: 8/19/00 06:04 AM
Low Point : 59.27 mV
Plot Scale: 250.0 mV
High Point : 309.27 mV

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00 015

FDS C-1 SITE CHROMATOGRAMS

Chromatogram

Sample Name : 147008-002sg, 57828
FileName : G:\GC15\CHB\238B011.RAW
Method : BTEH236.MTH
Start Time : 0.01 min
Scale Factor: 0.0

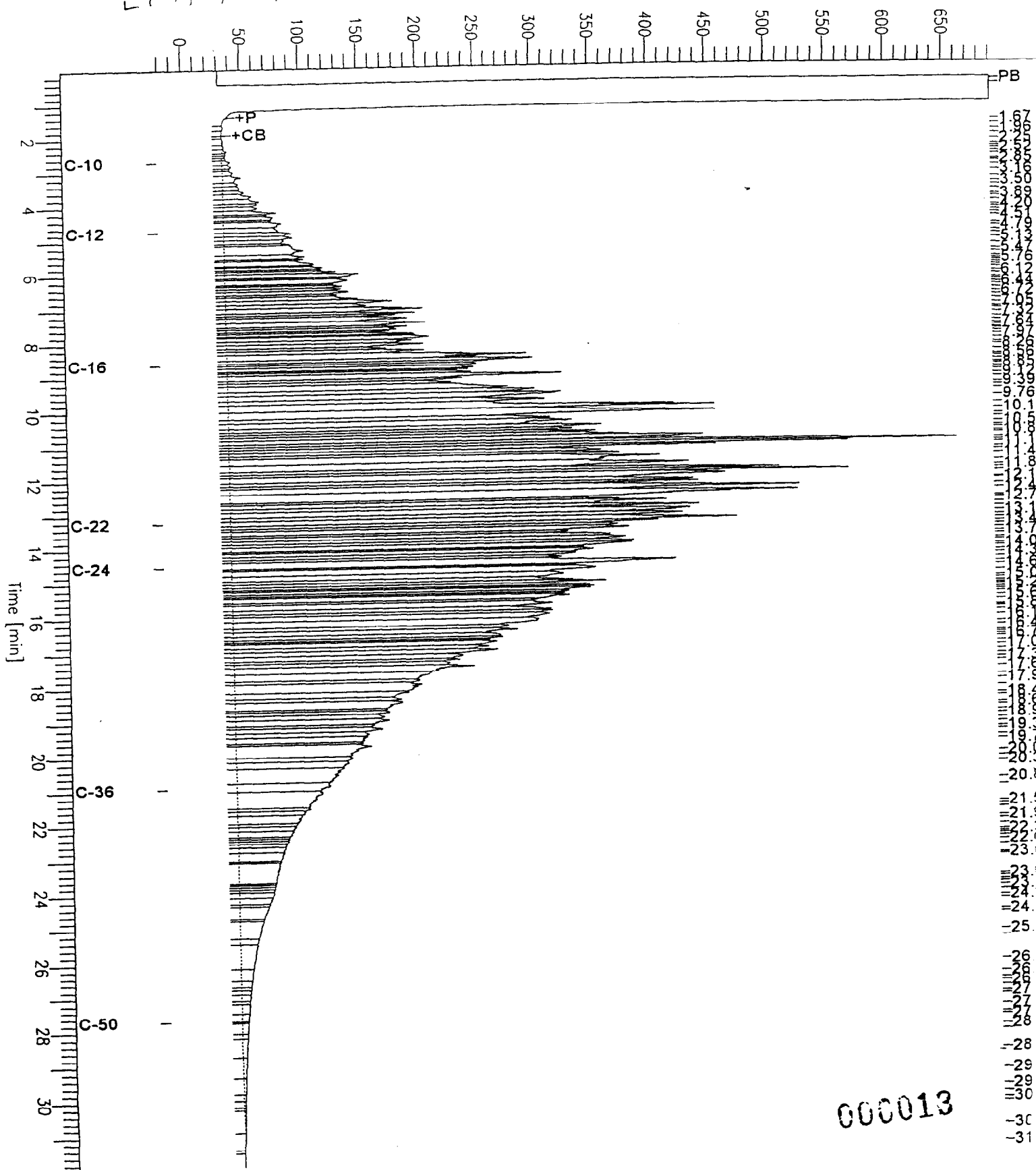
End Time : 31.91 min
Plot Offset: -21 mV

Sample #: 57828
Date : 08/27/2000 12:13 PM
Time of Injection: 08/26/2000 03:07 AM
Low Point : -21.12 mV
Plot Scale: 712.1 mV
High Point : 690.97 mV

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EFB-FDSCI-SBI-6

Response [mV]



WHARF TANK CHROMATOGRAMS

GC07 TVH 'A' Data File RTX 502

Sample Name : 147111-002,57804, tvh only

FileName : G:\GC07\DATA\232A016.raw

Method : TVHBTXE

Start Time : 0.00 min

Scale Factor: -1.0

End Time : 26.00 min

Plot Offset: 4 mV

Sample #: a1

Date : 8/20/00 12:39 AM

Time of Injection: 8/20/00 12:13 AM

Low Point : 4.36 mV

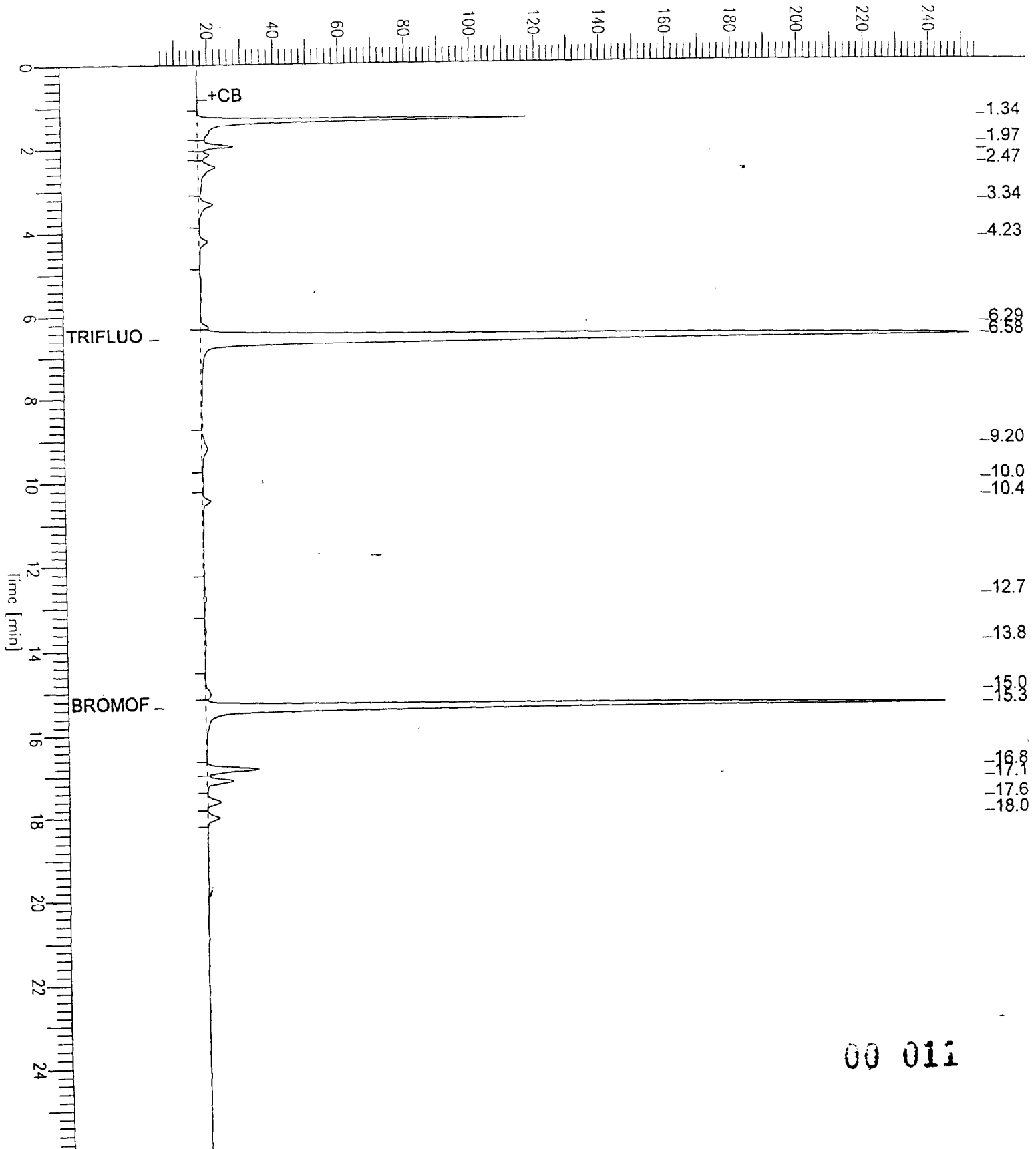
Plot Scale: 250.0 mV

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High Point : 254.36 mV

EFB-WT-SBI-QC

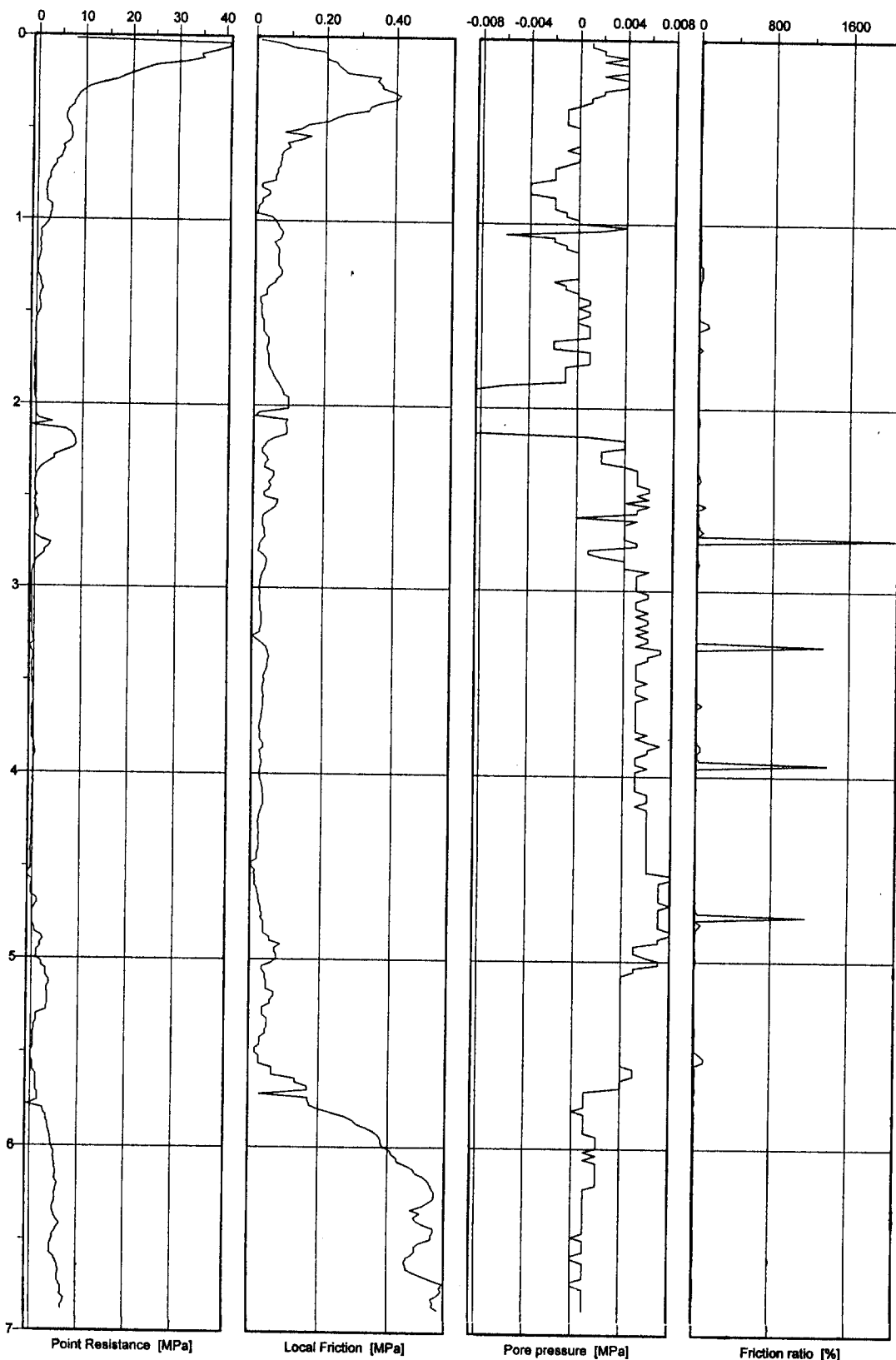
Response [mV]



00 011

APPENDIX D

CPT DATA



Point Resistance [MPa]

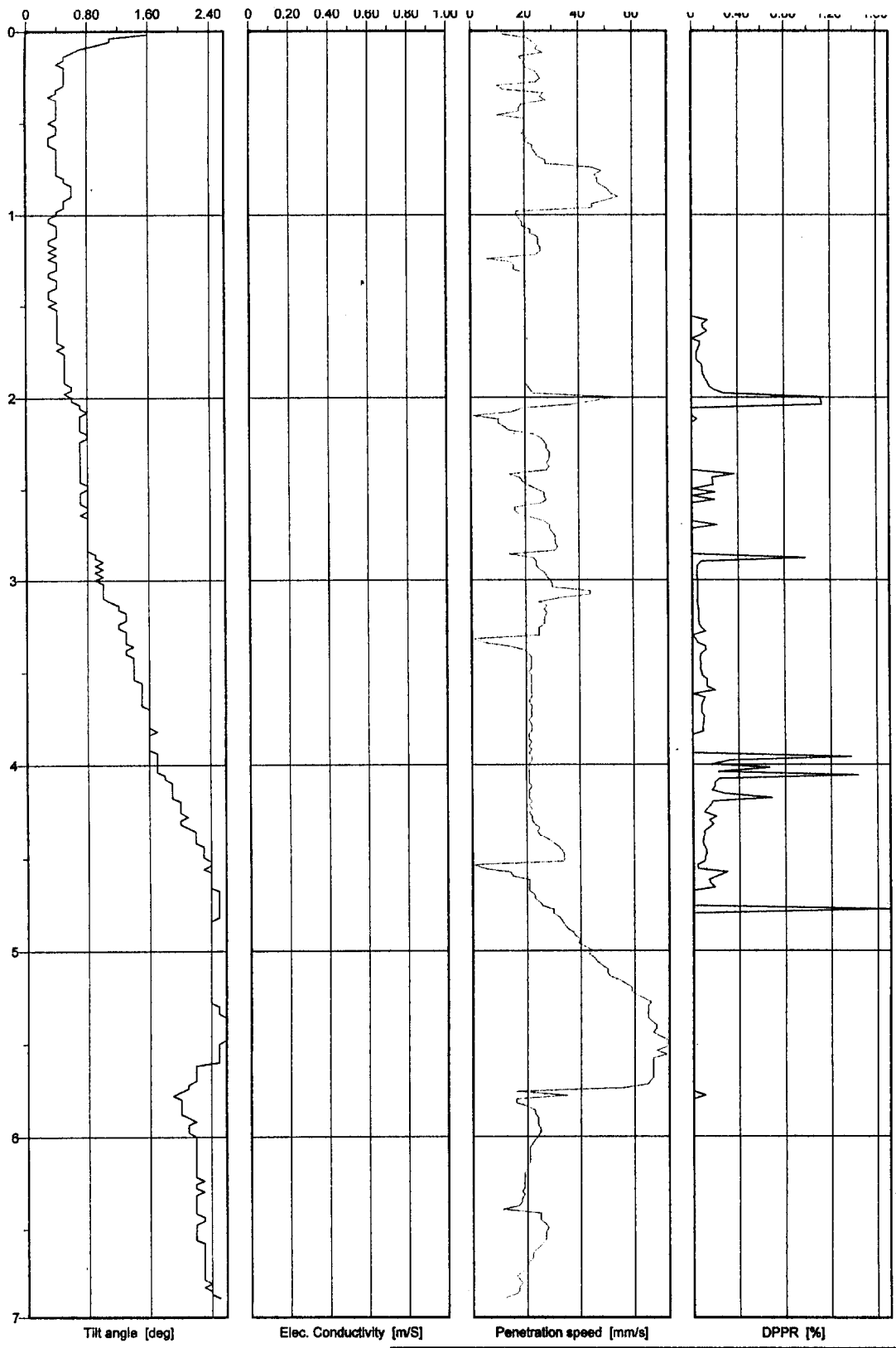
Local Friction [MPa]

Pore pressure [MPa]

Friction ratio [%]

Site no: 1	Position:	Z-Height:	Date: 8/15/00
Client:	East Fort Baker, CA	File: SB-1.CPT	
Contractor:	Geofon, Inc.	Scale:	Page: 1/1
		Project No: 05-5524	Fig:

Sounding made with Geotech CPT equipment



Tilt angle [deg]

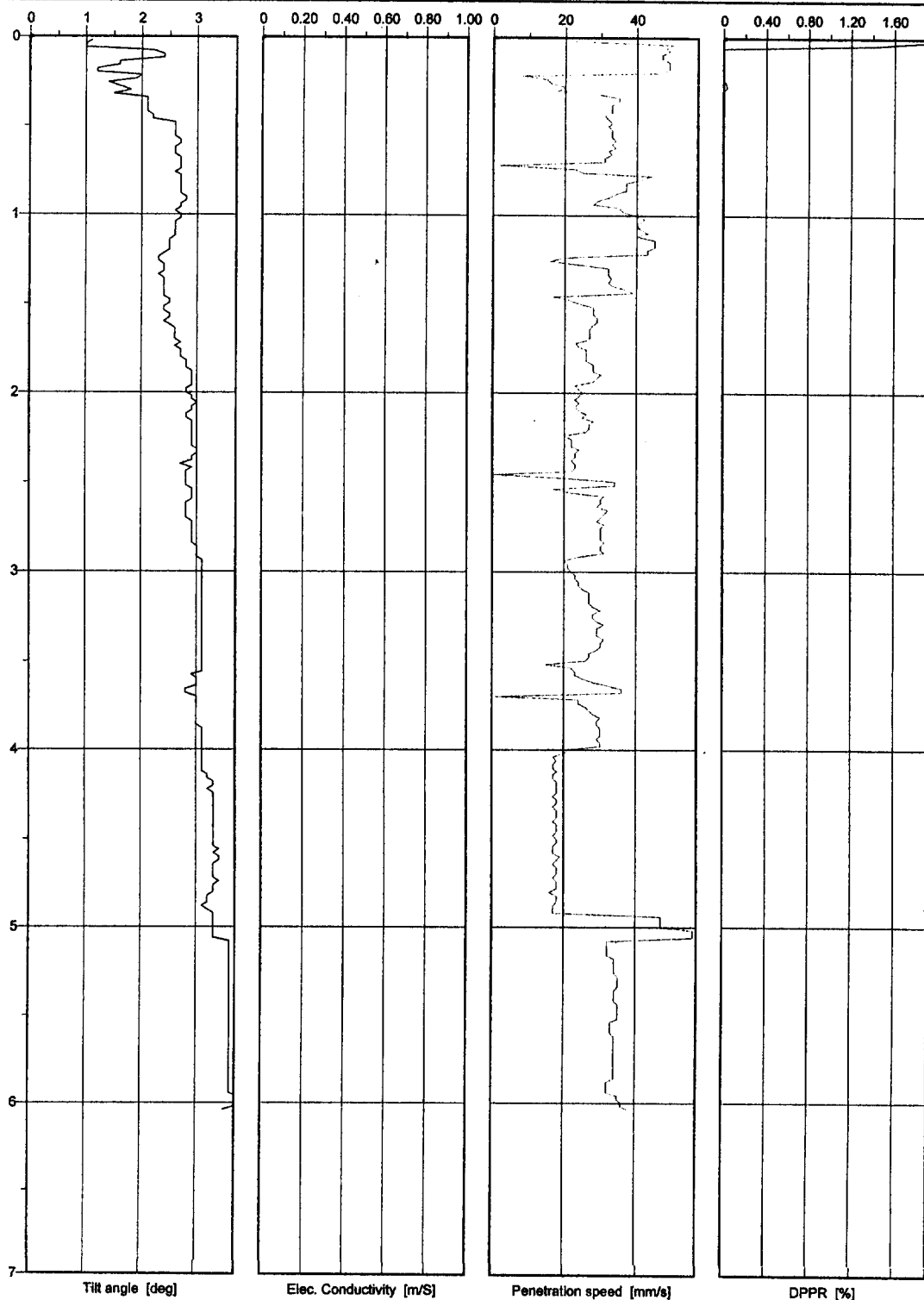
Elec. Conductivity [m/S]

Penetration speed [mm/s]

DPPR [%]

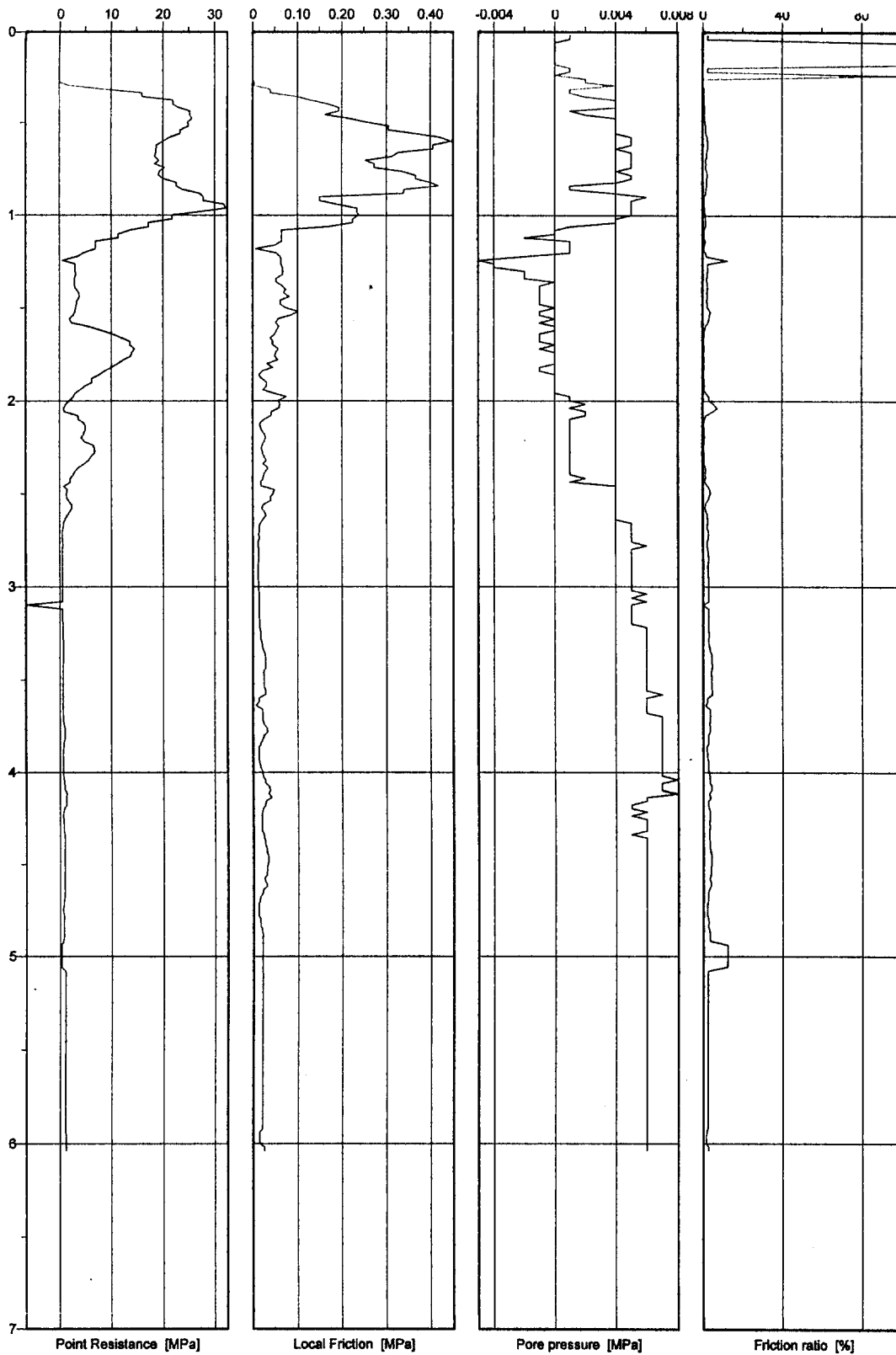
Site no: 1	Position:	Z-Height:	Date: 8/15/00
Client:	East Fort Baker, CA	File: SB-1.CPT	
Contractor:	Geofon, Inc.	Scale:	Page: 1/1
		Project No: 05-5524	Fig:

Sounding made with Geotech CPT equipment



Site no: 1	Position: X-KOORD: 0.0 m, X-KOORD: 0.0 m	Z-Height: + 0.00	Date: 8/15/00
Client:	File: SB-2.CPT		Scale:
Contractor:	Page: 1/1		Project No: 06-5524
		Fig:	

Sounding made with Geotech CPT equipment



Point Resistance [MPa]

Local Friction [MPa]

Pore pressure [MPa]

Friction ratio [%]

Site no: 1	Position: X-KOORD: 0.0 m, X-KOORD: 0.0 m	Z-Height: + 0.00	Date: 8/15/00
Client:	East Fort Baker, CA	File: SB-2.CPT	
Contractor:	Geofon, Inc.	Scale:	Page: 1/1
		Project No: 05-5524	Fig:

Sounding made with Geotech CPT equipment

APPENDIX E

CHEMICAL QUALITY ASSURANCE REPORT



U. S. Army Corps of Engineers
Environmental Engineering Branch
Sacramento District
1325 J Street
Sacramento, California 95814

Chemical Quality Assurance Report
Petroleum Sites Program
East Fort Baker, California

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Attachments:

1. COC
2. Table 4-1, EM 200-1-6

**DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814**

PROJECT SUMMARY

SUBJECT: CHEMICAL QUALITY ASSURANCE REPORT

PROJECT: EAST FORT BAKER, PETROLEUM SITES PROGRAM

PROJECT MANAGER: DOUG DELANEY

PROJECT TEAM LEADER: EILEEN MCBRIDE

DESIGN TEAM LEADER: MEEGAN NAGY

PROJECT CHEMIST: LETICIA SANGALANG

DATES SAMPLED: 7,10,15,16 AUGUST 2000

2.0 EXECUTIVE SUMMARY

This Chemical Quality Assurance Report (CQAR) summarizes the results of split samples collected during the course of site investigation activities at East Fort Baker. The quality assurance (QA) and primary laboratories received split samples on the following dates: 8/9, 8/11, and 8/17/00. Samples collected on 15 and 16 of August were shipped to the QA laboratory on August 17, 2000.

This CQAR is intended to provide the data user with a review of chemical data quality based on independent comparison of the duplicate sample results. Project data quality has been evaluated using requirements provided in the final draft of the Work Plan, Base Realignment and Closure Site Inspection (BRAC SI), East Fort Baker, Final, Sept 1997 and it's addendum BRAC SI QAPP, East Fort Baker, Petroleum Sites Program, Final, August 2000. The content and format of this report is based on the guidance contained in *EM-200-1-6*.

The QA laboratory received three water samples and three soil samples requiring the following analysis: (1) water for 8260/BTEXM (benzene, toluene, ethylbenzene, xylenes, methyl tertbutyl ether); (1) water/8015M/TEPH-d&mo (total extractable petroleum hydrocarbons as diesel and motor oil); (1) water/8310-PAHs (polynuclear aromatic hydrocarbons); (1) soil/6010-Pb (lead); (1) soil/8015M/TPH-g (total purgable hydrocarbons as gasoline); (1) soil/TEPH-d&mo.

Sequoia Analytical was U.S. Army Corps of Engineers (USACE) QA laboratory and is located at 1455 McDowell Blvd, North, Suite D, Petaluma, CA 94954. Curtis & Tompkins located at 2323 Fifth Street, Berkeley, CA 94710 analyzed the primary samples. Both laboratories are (USACE) validated and certified by the State of California.

Several nonconformances were noted with this EFB sampling event: (1) No trip blanks were sent to the laboratories as required by QAPP. (2) The QA laboratory omitted method 8260/BTEXM sample analysis on EFB-FDSC10-SB1 as specified by the COC. (3) Sample EFB-FDSC10-SB1-QA was collected on 16 August 2000, prepared and analyzed on 22 August 2000. The EFB QAPP addendum specified that the sample holding times should be 48 hours for BTEXM and TPH-g. (4) The QA lab's method blank was contaminated with diesel for method 8015M/TEPH-d. (5) The primary lab's method blank was contaminated with xylenes for analysis 8260/BTEXM.

3.0 Sampling Handling For QA Laboratory

3.1 Field Sample Identification:

Table 1

<u>Sampling Date</u>	<u>Field ID</u>	<u>Lab ID</u>	<u>Matrix</u>	<u>Test Methods</u>
8/7/00	EFB-AST637-SB6-QA	P008208-01	Soil	8015M/TEPH; 8310/PAHs
8/10/00	EFB-AST637-SW1-QA	P008276-01	Water	8015M/TEPH; 8310/PAHs
8/15/00	EFB-AST637-SW1-QA	P008381-01	Water	8260/BTEXM
8/16/00	EFB-FDSC10-SB2-QA	P008381-02	Soil	6010/Pb
8/16/00	EFB-WT-SB1-QA	P008381-03	Water	8015M/TPH
8/16/00	EFB-FDSC10-SB1-QA	P008381-04	Soil	8260/BTEXM; 8015M/TPH

3.2 Sample Preparation: Sample preparations were employed with all of the samples as specified in the QAPP. In addition, some of the organic analysis required silica gel cleanup procedures to eliminate other interferences. EPA method 5030 was used in preparing the soil sample for lead analysis.

3.3 Chain-of-Custody (COC): Correct protocols were followed with proper documentation for all EFB samples delivered to QA laboratory. Attached are copies of the required COC documents.

3.4 Cooler Receipt: All samples were delivered to the laboratory at the project required control temperatures, 4 °C +/- 2°.

3.5 Sample Preservation: EnCore™ soil samples were sent to the QA laboratory with no preservative as required by the QAPP. However, hydrochloric acid (HCl) was added to the water samples as a preservative for analysis of method 8310 as per QAPP.

4.0 QC Evaluation for USACE QA and Primary Laboratories

4.1 QA Laboratory's QC Data Evaluation:

4.1.1 Accuracy:

a. Method Blanks (MBs): MBs showed no contamination for the target analytes with following exception:

- MB 8015/TEPH contained trace amounts of hydrocarbons in the range of diesel, 0.32 mg/l. The acceptance criterion for blank contamination as stated by the QAPP is that TEPH contaminants be less than ½ the PQL (50 ug/l).

b. Surrogates: All QC surrogate recoveries were within the QAPP required control limits (65 – 135%) with the exception of the following:

- Surrogate recoveries for samples 8310/PAHs were outside the control limits for samples EFB-AST637-SW1-QA and EFB-AST637-SB6-QA. Surrogate recovery for the latter sample, Terphenyl-d14, was high (166%). Surrogate recoveries for sample EFB-AST637-SW1 were

high, terphenyl-d14 – 358%. The high surrogate recoveries may be indicative of matrix interference. The lab re-extracted and reanalyzed the samples to confirm matrix interference.

c. Matrix Spike (MS) and Matrix Spike Duplicates (MSD): The MS and the MSD recoveries for organic analysis were all within the project's required control limits (65 - 135%) with the exception of the following:

- Several of the MS target analytes were out of control, reading higher than the maximum control limit. The spiked analytes included benzo (a) anthracene, fluoranthene, phenanthrene, and pyrene. High MS recoveries may indicate high bias and false positives for the measured analytes.

d. Laboratory Control Sample (LCS): The LCS recoveries for all methods were within the required control limits, 65 – 135%.

e. Holding Times: All samples were extracted and/or analyzed within the required holding times with exception of sample EFB-FDSC10-SB1. The QAPP Addendum specifies that the sample's holding time shall be 48 hours for analysis methods 8260 and 8015.

f. Trip Blanks (TBs): No trip blanks were sent to USACE QA laboratory. The absence of a TB is a nonconformance with the QAPP requirement. The volatile organic results may contain false positives because a trip blank was not analyzed and any hits would have to be attributed as site contaminants.

4.1.2 Precision:

MS and MSD: The agreement between duplicate analysis (e.g. MS/MSD) was within the control limits established in the QAPP and therefore, indicates acceptable precision in the measurement system.

4.1.3 Sensitivity: The lab's method detection limits (MDLs) were not defined. The reporting limits (RL) of the QA lab, Sequoia, are consistently higher than the QAPP requirements for all required methods of analysis. The lab discussed not being able to attain the RLs with the project chemist. The high RLs may lead to false negatives and low bias for the QA target analytes.

4.2 Primary Lab's QC Data Evaluation:

4.2.1 Accuracy:

a. MBs: The primary laboratory MBs results showed no contamination for the target analytes with the exception of the following:

- The method blank for 8260/BTEXM contained trace amounts of m, p-xylenes, at 0.4 ug/l. The lab's reporting limit for total xylenes in a water sample is 1.0 ug/l. However, the QAPP Addendum specifies that the acceptance criteria should be less than ½ PQL of the target analytes. Contamination of the method blank may indicate false positives and high bias for m, p-xylenes.

b. Surrogates: All surrogate recoveries were within the QAPP required control limits, 65 - 135%.

c. MS and MSDs: The matrix spikes and matrix spiked duplicates recoveries were within the required control limits, 65 – 135%.

- d. Laboratory Control Sample (LCS): The LCS sample recoveries for the different methods were within the project's acceptable control limits, 65 – 135%.
- e. Holding Times: All samples were extracted and/or analyzed within the required holding times.
- f. Cooler temperatures: The samples were delivered to the primary lab at colder temperatures than required, 1.4 °C, QAPP requirement 4 ± 0.2°C. Colder temperatures may indicate false negatives and low bias.
- g. Trip Blanks: No TBs were sent to the primary laboratory as required by the QAPP. The volatile organic values may contain false positives because a trip blank was not analyzed and any hits would have to be attributed as site contaminants. Major parameters affected by the absence of a TB include representativeness, accuracy, and completeness.

4.2.2 Precision:

- a. MS and MSD: The MS and MSD recoveries showed very good precision for the project target analytes.
- b. LCS: The LCS recoveries were all within the project required control limits, 65 – 135%.

4.2.3 Sensitivity: The primary lab's method detection limits were given in the QAPP. In most cases, Curtis & Tompkins Lab's RLs met the QAPP's specified control limits for all requested method of analysis.

5.0 Data Comparison

5.1 Evaluation Criteria:

Criteria for the assessment of agreement between split samples have been based on guidance contained in the CRREL Special Report No. 96-9 and the attached table 4.1, EM 200-1-6. Result pairs differing by less than a factor of 2.5 (RPD = 85%) have been labeled **Acceptable**, those differing by a factor of 2.5 to 4 (RPD = 85% - 120%) have been labeled with **Disagreement**, and those differing by a factor greater than 4 (RPD > 120%) have been labeled with **Major Disagreement**.

5.2 8015M/TPH-g (Soil sample: EFB-FDSC10-SB1) The QA split sample results showed acceptable precision as shown in tables 10. The absence of the TB showed no major affect on the precision of the split sample data results.

5.3 8015M/TPH-g (Water sample: EFB-WT-SB1) The split sample data results showed acceptable precision as shown in table 9.

5.4 8015M/TEPH-d&mo. (Soil sample: EFB-AST637-SB6) QC sample duplicate results showed acceptable precision and accuracy for diesel and motor oil but QA split sample precision results for diesel showed a major discrepancy, table 2. The primary lab's surrogate and matrix spike recoveries were out of control for sample EFB-AST637-SB6. High surrogate recoveries in samples may indicate high bias and false positives for the analytes.

5.5 8015M/TEPH-d&mo. (Water sample: EFB-AST-637-SW1, table 4) Split sample data showed major discrepancies for diesel and motor oil as indicated by the RPD values. Major discrepancies maybe a result of nonhomogenous samples.

5.6 8260/BTEXM. (Water sample: EFB-AST637-SW1, tables 6) The QA split sample results for EFB-AST637-SW1 showed acceptable precision as indicated by the RPDs of the split sample data for target analytes.

5.7 8260/BTEXM. (Soil Sample: EFB-FDSC10-SB1) The QA laboratory did not submit a result for EFB-FDSC10-SB1 and therefore, data was not compared. A phone call to the laboratory confirmed that the lab did not analyze the sample.

5.8 8310/PAHs. (Soil sample: EFB-AST637-SB6, table 3) The split sample data had one major discrepancy among the 18 target analytes, chrysene. This one major discrepancy does not affect the overall precision of the laboratory split sample data.

5.9 8310/PAHs. (Water sample: EFB-AST-637-SW1, table 5) The split sample data for PAHs in water showed acceptable precision.

5.10 6010/Lead (Pb). (Soil sample: EFB-FDSC110-SB1) USACE QA lab and primary lab results showed good agreement for method 6010/Pb, table 10. The lead results indicate acceptable precision between the split sample data. The precision met QAPP specified criteria for lead.

6.0 Data Summary: Data for ninety-three (93) pairs of the project target analytes were reported out of an expected ninety-eight pairs (98) pairs for split sample comparison. The QA lab did not analyzed sample # EFB-FSC10-SB1 for BTEXM resulting in five target analytes not being reported. There were major disagreements with the split sample data for analysis method 8015M/TEPH-d, samples EFB-AST637-SB6 and EFB-637-SW1. Split sample results for EFB-AST-637-SW1 also showed a major disagreement. The major disagreements for TEPH diesel and motor oil may indicate sample in homogeneity and a non-representative sample. In addition, there was a major disagreement for one of the target analytes (chrysene) for method 8310/PNA. Based on the QA split sample data review, the overall quality of the data is acceptable for the intended purpose.

References

1. EM 200-1-6, Chemical Quality Assurance for HTRW Projects, October 1997.
2. CRREL Special Report No. 96-9, Comparison Criteria for Environmental Chemical Analysis of Solid Samples Sent to Different Laboratories, Corps of Engineers Archived Data, May 1996.
3. Work Plan BRAC Site Inspection, East Fort Baker, California, Final September 1997.
4. BRAC SI FSP Addendum, East Fort Baker, Petroleum Sites Program, August 2000.
5. BRAC SI QAPP Addendum, East Fort Baker, Petroleum Sites Program, August 2000.
6. Test Methods for Evaluating Solid Waste, SW-846, Physical and Chemical Methods, Update I, II, and III, USEPA December 1998.
7. National Functional Guidelines for Organic and Inorganic Data Review, USEPA, February 1994.

TABLES

Petroleum Sites Program - EFB
ECQA Report # 020401-1

Table 2
Method 8015M: TEPH (d/mo)
Sample Preparation: SW-3520/3630
Split Sample ID: EFB-AST-637-SB6
Sample Matrix: Soil
Units; (mg/kg)

Analyte	Project PQLs	QA Lab Results	RL	Primary Lab Results	RL	RPD	Status
Diesel	1.0	ND	6.59	2100	26	198.7	MD
Motor Oil		36.9	13.2	<130	-	-	A
Unknown (HC) _x		862	6.59	NR			

Table 3
Method 8310/PAHs
Sample Preparation: SW-3550/3640
Split Sample ID: EFB-AST-637-SB6
Sample Matrix: Soil
Units: (ug/kg)

Analyte	Project PQLs	QA Lab Results	RL	Primary Lab Results	RL	RPD	Status
Acenaphthene	50	ND	336	ND	44	NA	A
Acenaphthylene	50	ND	653	ND	440	NA	A
Anthracene	10	ND	33.6	ND	22	NA	A
Benzo (a) anthracene	5	ND	33.6	23	4.3	NA	A
Benzo (b) fluoranthene	5	ND	33.6	<8.8	8.8	NA	A
Benzo (k) fluoranthene	5	ND	33.6	ND	4.3	NA	A
Benzo (g,h,l) perylene	5	ND	65.3	ND	8.8	NA	A
Benzo (a) pyrene	2	ND	33.6	ND	4.3	NA	A
Chrysene	5	ND	33.6	160	4.3	130.6	MD
Dibenz(a,h) anthracene	5	ND	132	ND	8.8	NA	A
Fluoranthene	5	ND	33.6	33	17	NA	A
Fluorene	5	98.6	65.3	87	44	12.5	A
Indeno (1,2,3-cd) pyrene	5	ND	33.6	ND	4.3	NA	A
1-Methylnaphthalene	-	414	336	-	-	-	-
2-Methylnaphthalene	-	380	336	-	-	-	-
Naphthalene	50	ND	336	210J	220	NA	A
Phenanthrene	10	ND	33.6	150	22	NA	A
Pyrene	5	ND	33.6	21	8.8	NA	A

Petroleum Sites Program - EFB
ECQA Report # 020401-1

Table 4
Method 8015M: TEPH (d/mo)
Sample Preparation: 3520/3630
Split Sample ID: EFB-AST-637-SW1
Sample Matrix: Water
Units: (ug/l)

Analyte	Project PQLs	QA Lab Results	RL	Primary Lab Results	RL	RPD	Status
Diesel	50	ND	6.59	35,000	100	199.9	MD
Motor Oil		0.925J	13.2	490	600	189.5	MD
Unknown (HC) _x		27.1		NR	-	-	-

Table 5
Method 8310/PAHs
Sample Preparation: SW-3550/3640
Split Sample ID: EFB-AST-637-SW1
Sample Matrix: Water
Units: (ug/l)

Analyte	Project PQLs	QA Lab Results	RL	Primary Lab Results	RL	RPD	Status
Acenaphthene	5	ND	336	ND	4.9	NA	A
Acenaphthylene	5	ND	653	ND	49	NA	A
Anthracene	1.0	ND	33.6	ND	2.4	NA	A
Benzo (a) anthracene	0.5	ND	33.6	0.96	0.49	NA	A
Benzo (b) fluoranthene	0.5	ND	33.6	ND	0.97	NA	A
Benzo (k) fluoranthene	0.5	ND	33.6	ND	0.49	NA	A
Benzo (g,h,l) perylene	0.5	ND	65.3	ND	0.97	NA	A
Benzo (a) pyrene	0.02	ND	33.6	ND	0.49	NA	A
Chrysene	0.5	ND	33.6	3.9	0.49	NA	A
Dibenz(a,h) anthracene	0.5	ND	132	ND	0.97	NA	A
Fluoranthene	0.5	ND	33.6	<1.9	1.9	NA	A
Fluorene	0.5	4.12	65.3	4.7J	4.9	13.6	A
Indeno (1,2,3-cd) pyrene	0.5	ND	33.6	ND	0.68	NA	A
1-Methylnaphthalene	-	ND	336	-	-	-	-
2-Methylnaphthalene	-	ND	336	-	-	-	-
Naphthalene	5	ND	336	NA	24	NA	A
Phenanthrene	1.0	ND	33.6	11	2.4	NA	A
Pyrene	0.5	ND	33.6	1.4	0.97	NA	A

Petroleum Sites Program - EFB
ECQA Report # 020401-1

Table 6
Method 8260/BTEXM
Sample Preparation: SW-5030
Split Sample ID: EFB-AST-637-SW1
Sample Matrix: Water
Units: (ug/l)

Analyte	Project PQLs	QA Lab Results	RL	Primary Lab Results	RL	RPD	Status
Benzene	0.5	ND	5.00	ND	0.5	NA	A
Ethylbenzene	0.5	ND	5.00	ND	0.5	NA	A
Methyl tert-butyl ether	0.5	ND	5.00	ND	0.5	NA	A
Toluene	0.5	ND	5.00	ND	0.5	NA	A
Xylenes (total)	1.0	ND	5.00	0.4J	0.5	NA	A

Table 7
Method 8260/BTEXM
Sample preparation: SW-5030
Split Sample ID: EFB-FDSC10-SB1
Sample Matrix: Soil
Units: (mg/kg)

Analyte	Project PQLs	QA Lab Results	RL	Primary Lab Results	RL	RPD	Status
Benzene	5.0	NR	5.0	ND	5.9	NC	-
Ethylbenzene	5.0	NR	5.0	4.3J	5.9	NC	-
Methyl tert-butyl ether	5.0	NR	5.0	ND	5.9	NC	-
Toluene	5.0	NR	5.0	ND	5.9	NC	-
Xylenes (total)	5.0	NR	5.0	16.0	5.9	NC	-

Petroleum Sites Program - EFB
ECQA Report # 020401-1

Table 8
Method 6010/Pb
Sample Preparation: SW-3050
Split Sample ID: EFB-FDSC10-SB2
Sample Matrix: Soil
Units: (mg/kg)

Analyte	Project PQL	QA Lab Results	RL	Primary Lab Results	RL	RPD	Status
Lead (Pb)	10	70.4	7.50	87	0.16	21.1	A

Table 9
Method 8015M/TPH-g
Sample Preparation: SW-5030
Split Sample ID: EFB-WT-SB1
Sample Matrix: Water
Units: (ug/l)

Analyte	Project PQL	QA Lab Results	RL	Primary Lab Results	RL	RPD	Status
Gasoline	50	ND	50.0	37J	50	NA	A

Table 10
Method 8015M/TPH-g
Sample Preparation: SW-5030
Split Sample ID: EFB-FDSC10-SB1
Sample Matrix: Soil
Units: (mg/kg)

Analyte	Project PQL	QA Lab Results	RL	Primary Lab Results	RL	RPD	Status
Gasoline	1.0	1.83	1.0	1.9	0.20	3.75	A

Legend:

1. NC - Not Calculated
2. RL - Reporting Limit
3. PQL - Practical Quantitation Limits
3. QA - Quality Assurance
4. NR - Not Reported
5. A - Acceptable
6. MD - Major Disagreement
7. RPD - Relative Percent Difference
8. BTEXM - Benzene, Toulene, Ethylbenzene, Xylenes, Methyl Tertiary Butyl Ether
9. ug/l - micrograms per liter
10. ug/kg - micrograms per kilogram
11. mg/l - milligram per liter
12. mg/kg - milligram per kilogram
13. ND - not detected

ATTACHMENTS

CHAIN OF CUSTODY RECORD

US ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT

Environmental Engineering Branch

SPK-ED-E

1325 J Street

Sacramento, California

95814-2922



Project Name: East Fort Baker - POL
 Project Location: Sausalito - CA
 Project Coordinator: Leticia Sangalang
 Phone: 916-557-7650 FAX: 916-557-5307
 Sampler: Meegan Galie Phone: 916-557-7257

Laboratory: Sequoia
 Address: 1455 McDowell Blvd
Suite D Petaluma CA 94954
 Contact: Marvin Heskett
 Phone: 707-792-7514

ANALYSIS REQUESTED >

SAMPLE IDENTIFICATION

Field

Laboratory

GRAB

COMP

DATE

TIME

EEB-AST637-SW1-QA

X

8/10/00

1400

XX

P008276-01

21 W

4

Temp Blank

COOLER CUSTODY SEALS INTACT ☐NOT INTACT ☐COOLER TEMPERATURE 5 °C

COMMENTS/SPECIAL INSTRUCTIONS:

CHECKED BY:

PRESERVATIVE CODES:

C = HCl N = HNO₃ S = H₂SO₄

SAMPLE DISPOSAL:

☐ Hold ☒ Dispose ☐ Return

RELINQUISHED BY

DATE/TIME

RECEIVED BY

DATE/TIME

Meegan Galie

8/10/00 1800

Scott Stevenson

8/11/00 9:15

MATRIX CODES:

W = Water SI = Sludge SP = Solid Product
S = Soil A = Air LP = Liquid Product
Sd = Sediment

SHIPPING:

☒ Fed Ex ☐ Courier ☐ Hand Deliver

Airbill Number:

CHAIN OF CUSTODY RECORD

US ARMY CORPS OF ENGINEERS SACRAMENTO DISTRICT Environmental Engineering Branch SPK-ED-E 1325 J Street Sacramento, California 95814-2922				Project Name: <u>East Fort Baker - FOL</u> Project Location: <u>Sausalito, CA</u> Project Coordinator: <u>Leticia Sangalang</u> Phone: <u>916-557-7650</u> FAX: <u>916-557-5307</u> Sampler: <u>Meegan Galie</u> Phone: <u>916-557-7257</u>				Laboratory: <u>Squoa</u> Address: <u>1455 McDowell Blvd. N</u> <u>Suite D Petaluma CA 94964</u> Contact: <u>Marvin Heskett</u> Phone: <u>707-792-7514</u>			
ANALYSIS REQUESTED				NUMBER OF CONTAINERS PLASTIC GLASS VOA SLEEVE FIELD FILTERED PRESERVATIVE CODE							
SAMPLE IDENTIFICATION Field Laboratory		GRAB COMP	DATE TIME	TURN AROUND TIME (DAYS)		MATRIX CODE					
EFB-ASTG37-Sul-QA		X	8/15/00 1045	21 W		3					
Temp Blank						1					
EFB-ASTG37-Sul-QA											
EFB-FDSC10-SB2-QA		X	8/16/00 1617	21 S		1					
EFB-WJ-SB1-QA		X	8/16/00 1000	21 W		2					
EFB-FDSC10-SB1-QA		X	8/16/00 1625	21 S		8					
COMMENTS/SPECIAL INSTRUCTIONS: <u>Call #62</u>				CHECKED BY: <u>ELL</u>		PRESERVATIVE CODES: C = HCl N = HNO ₃ S = H ₂ SO ₄					
COOLER TEMPERATURE: <u>2</u>				SAMPLE DISPOSAL: <input type="checkbox"/> Hold <input checked="" type="checkbox"/> Dispose <input type="checkbox"/> Return		MATRIX CODES: W = Water SI = Sludge SP = Solid Product S = Soil A = Air LP = Liquid Product Sd = Sediment					
RELINQUISHED BY <u>Meegan Galie</u>		DATE/TIME <u>8/16/00 1900</u>		RECEIVED BY <u>Scott Stevenson</u>		DATE/TIME <u>8/17/00 9.45</u>					
SHIPPING: <input checked="" type="checkbox"/> Fed Ex <input type="checkbox"/> Courier <input type="checkbox"/> Hand Deliver				Airbill Number: <u>8213-42401431</u>							

Table 4-1
Criteria for Comparing Field
QC and QA Sample Data
(see text)

Matrix	Parameter	Disagreement	Major Disagreement
All	All	>5x difference when one result is < DL	>10x difference when one result is < DL
All	All	>3x difference when one result is < RL	>5x difference when one result is < RL
Water	All except TPH	>2x difference	> 3x difference
Soil	All except metals, VOCs, BTEX, and TPH	>4x difference	>5x difference
Soil	Metals	>2x difference	≥3x difference
Water and Soil	TPH	Arbitrary (suggest >3x difference)	Arbitrary (suggest >5x difference)
Soil	VOCs and BTEX	Arbitrary (suggest >5x difference)	Arbitrary (suggest >10x difference)

Reference: CRREL Special Report No. 96-9, "Comparison Criteria for Environmental Chemical Analyses of Split Samples Sent to Different Laboratories - Corps of Engineers Archived Data", Grant, C.G., Jenkins, T.F., and Mudambi, A.R., USACE Cold Regions & Environmental Research Laboratory, Hanover NH, May 1996.

APPENDIX F

CHEMICAL DATA QUALITY ASSESSMENT REPORT

CHEMICAL DATA QUALITY ASSESSMENT REPORT
EAST FORT BAKER
MARIN COUNTY, CA

Prepared By:



**U.S. Army Corps
of Engineers**

Environmental Design Section

JUNE 2001

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LIST OF ACRONYMS

CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CLP	Contract Laboratory Program
EDS	Environmental Design Section
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ug/Kg	micrograms/kilogram
mg/Kg	milligrams/kilogram
%R	Percent Recovery
PCB	Polychlorinated Biphenyls
QA	Quality Assurance
QC	Quality Control
QAPP	Quality Assurance Project Plan
RPD	Relative Percent Difference
SD	Sample Duplicate
SDG	Sample Delivery Group
SI	Site Inspection
SVOC	Semivolatile Organic Compound
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Sacramento District conducted a soil and groundwater sampling event for the site investigation at East Fort Baker, Marin County, California. The Environmental Design Section, USACE, conducted this project. Samples were analyzed for petroleum hydrocarbons as gasoline and diesel, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), and metals. Curtis & Tompkins, Ltd. Analytical Laboratories of Berkeley, California, performed all primary analyses in which the laboratory generated its reports and data packages for submittal to USACE. The sample delivery groups (SDGs) included in this review are 146977, 147007, 147008, 147111, 147351, 147505, and 147835. Analyses were performed in accordance to the Work Plan BRAC Site Inspection, East Fort Baker, California. The review criteria employed in the generation of this report is based on the quality control (QC) requirements contained in the analytical method and the QAPP; the review procedure is consistent with *U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for Organic/Inorganic Data Review*, 1994 revision, to the extent possible. The information presented below is an assessment of the precision, accuracy and representativeness of the analytical data based on the following QC parameters:

1.1 Sample collection, preservation, and handling

In order to assure that the sampling plan was implemented in such a way that representative samples were obtained, sample collection, preservation, and handling must be evaluated. Once the sample has been collected it must be stored and preserved to maintain the chemical and physical properties that it possessed at the time of collection. Sampling equipment, decontamination procedures, sample collection (including consideration of field parameter stability), container preparation and type, shipping and storage procedures, and preservation methods are all items that must be thoroughly examined in order to maintain the integrity of the samples. Laboratory and field records have been examined as a means of determining representativeness.

1.2 Holding times

Technical requirements for holding time of samples have been established to assure that samples are analyzed before the chemical integrity of the matrix and analytes are affected by biological or chemical degradation. The holding time for water and soil samples, as stated in SW-

846 (3rd Edition, Update III, December 1996) is as follows:

- Maximum holding times for VOCs and purgeable hydrocarbons are cooled (4°C) soil samples is 48 hours from sample collection, and acid-preserved (pH < 2) and cooled water samples is 14 days from sample collection.
- Maximum holding times for extractable hydrocarbons are cooled (4°C) soil samples is 14 days to extraction and 40 days following and cooled water samples is 7 days to extraction and 40 days following.
- Maximum holding times for polynuclear aromatic hydrocarbons (PAHs).
- Maximum holding times for metals analyzed by inductively coupled plasma (ICP) in soil and water samples is 6 months from sample collection for digestion and analysis.
- Soil samples and water samples that have not been maintained at 4°C and water samples not preserved to a pH ≤ 2 should be extracted or analyzed within 7 days from sample collection. If insufficient ice is used to ship samples, the laboratory may receive samples with no ice left in the cooler. Under these circumstances, the temperature of the samples may exceed 4°C.

1.3 Blanks

The purpose of laboratory (or field) blanks is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blank, instrument blank, trip blank, field blank, equipment blank). If problems with any blank exist, all associated data must be carefully evaluated to determine whether concentrations detected in associated samples can be attributed to field and/or laboratory activities.

1.4 Surrogate Recovery

Laboratory performance on individual samples is established by means of spiking activities. All samples are spiked with system monitoring compounds (surrogates) prior to sample purging or extraction. The evaluation of the percent recoveries (%R) of these surrogate compounds is not necessarily straightforward. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the evaluation and review of data based on specific sample results is frequently subjective and demands

analytical experience and professional judgement.

1.5 Matrix Spike/Matrix Spike Duplicate (MS/MSD and Relative Percent Difference

Data for matrix spikes (MS and/or MSD) are generated to determine the effect of various matrices on the long term precision and accuracy of the analytical method and to demonstrate acceptable matrix specific accuracy and precision by the laboratory at the time of sample analysis. For organic analyses, these data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgement, this data should be used in conjunction with other available QC information. Laboratory duplicate and field duplicate analyses are used to indicate precision, with laboratory duplicate relative percent difference (RPD) providing an indication of analytical precision, and field duplicate RPDs providing an indication of overall precision.

1.6 Laboratory Control Sample Recovery

Data for laboratory control samples (LCS) are generated to provide information on the accuracy of the analytical method and on the laboratory performance. In conjunction with MS/MSDs, the LCS provides a means of monitoring the overall performance of all steps in the analysis, including sample preparation.

The analyses below were evaluated using the formal guidelines of the documents referenced in Section 5.0, as well as the evaluator's professional judgement, in order to achieve the most complete and accurate assessment of the data.

2.0 PROJECT SAMPLES

2.1 Sample Collection, Preservation, Holding Times:

Equipment blank and soil samples were collected, stored and transported following approved procedures. Sample coolers arrived at the laboratory at $4^{\circ}\pm 2^{\circ}\text{C}$, with the exception of those associated with SDG 147111 in which were received by the laboratory at 1.4°C , associated samples are as follows:

EFB-AST637-SW1	EFB-FDSC10-SB1-3	EFB-EB-1
EFB-AST637-SW1-QC	EFB-FDSC10-SB2-4	EFB-SB-1
EFB-WT-SB1-GW	EFB-WT-SB1-GW	
EFB-FDSC10-SB1-QC	EFB-WT-SB1-QC	

Also, samples EFB-UST-699-CS4 and EFB-UST699-CS2A were outside the required temperature of $4^{\circ}\pm 2^{\circ}\text{C}$, these samples arrived at the laboratory at 1.4°C . It was not noted that these samples were frozen, therefore, data is not considered affected.

Holding times for all samples were within criteria for the project except for the following PAH samples:

EFB0AST637-SB5-GWRE	UST-699-SBRE	UST-699-RBRE
EFB-AST637-SW1-RE	EFB-AST637-SW1-QCRE	EFB-EB-1-RE

These re-extractions showed similar results to the primary extraction, therefore, the primary extraction results were used for data interpretation. These primary results were within the required holding times.

For sample EFB-EB-1-RE the re-extraction was within criteria even though it was beyond holding time, the data would not be considered effected because an equipment blank would not exhibit biological degradation of PAH's.

Custody of all project samples were maintained and documented from the time of collection up to completion of the analysis. All samples for VOC analyses were preserved with acid as prescribed by SW-846.

2.2 Sample Analysis:

Method SW8015 Modified - Purgeable (Gasoline)

Method Blanks and Trip Blanks:

Method blanks and trip blanks results were non-detect for the target analyte.

Surrogate Recovery:

Surrogate standard was spiked into all blanks, LCSs, MS/MSDs and samples as required. Surrogate recoveries were within project-required limits (65% - 135%).

MS/MSD:

The MS/MSD spikes were performed on project samples as required. Spike recoveries and RPDs were within project-required limits (65%-135%). For samples UST-699-CS-1, UST-699-CS-2, and UST-699-CS-3 laboratory indicated there was insufficient sample volume for analysis of the matrix spike and matrix spike duplicate; therefore, any gasoline specific matrix interference associated with UST-699-X¹ soil samples could not be identified. Surrogate recoveries suggest that interference is unlikely.

LCS:

The LCS recoveries were within project-required limits.

Identification and Quantitation:

Gasoline range organics (GRO) were either not reported in any of the samples or reported at low concentrations below the reporting limit for this project. USACE requested copies and reviewed all gasoline chromatography. This information showed proper calibration and quantitation by the lab. Sample results and reporting limits for soils were corrected for percent moisture as required.

1. X is the symbol used for the extending letters and numbers after UST-699

Method SW8015 Modified - Extractable (Diesel/Motor Oil)

Method Blanks and Equipment Blanks:

Method blanks and equipment blanks were non-detect for the target analyte.

Surrogate Recovery:

Surrogate standards were spiked into all blanks, LCSs, MS/MSDs and samples as required. Surrogate recoveries were within project required limits (65%-135%), with the exception of the surrogates in samples EFB-FDC1-SB1-6, EFB-FDSC1-SB1-3, EFB-AST637-SB7-4, and EFB-AST637-SB6, in which the surrogates were diluted out and no data was qualified.

MS/MSD:

The matrix spike samples were not analyzed for samples EFB-FDSC10-SB1-3, EFB-FDSC10-SB2-4, EFB-AST637-SB5-GW, EFB-FDSC1-SB1-6, EFB-AST637-SW1, and EFB-AST637-SW1-QC since the sample concentration was four times the spiked concentration. Therefore, no data were qualified and analytical accuracy and precision cannot be assessed.

For samples EFB-SB-1, EFB-FDSC1-SB1-6, EFB-AST638-SB5-GW, UST-699-CS-1, UST-699-CS-3, UST-699-SB, and UST-699-RB the percent recoveries (%R) and relative percent differences (RPD) were within QC limits. Therefore this indicates that the analytical procedures are accurate and precise.

For sample UST-699-CS2 one diesel matrix spike was below (30%) the QC limit (65%-135%); however, the RPD was acceptable at 29%. Therefore, results for soil at UST-699 maybe biased low.

LCS:

All analytes were within QC limits, except for one LCSD, which was slightly low, indicating the analytical method is in control and that the laboratory was capable of generating acceptable data.

Field Duplicates:

In two sets of water, field data, samples the RPD's were high for analytes detected in both samples. This is most likely due to high variability in contaminant concentrations in the water at the site.

Identification and Quantitation:

Calibration was within limits for all samples associated with this analysis.

Method SW8260 - Volatile Organic Compounds by GC/MS

Method Blanks and Trip Blanks:

There were no detected analytes in the trip blanks. The method blanks reported no detectable target analytes except for one method blank, where 0.4 ug/L of m,p-xylene was reported. The following samples, EFB-AST637-SW1 and EFB-AST637-SW1-QC with m,p-xylene concentrations of 0.4 ug/L and 0.5 ug/L should be considered not detected due to lab contamination.

Surrogate Recovery:

Surrogates were spiked into all blanks, LCSs and MS/MSDs as required. All surrogate recoveries were within project required limits with the following exceptions: Bromofluorbenzene in one soil method blank and Sample EFB-FDSC10-SB2-4 were recovered above project limits; toluene and m,p-xylene concentration in the sample may be biased high.

MS/MSD:

The MS/MSD spikes were performed on project samples as required. Matrix spike recoveries and RPDs were within project-required limits.

LCS:

All LCS recoveries were within project-required limits.

Field Duplicates:

For samples EFB-AST637-SW1, EFB-AST637-SW1-QC, EFB-FDSC10-SB1-QC, and EFB-FDSC10-SB1-3 were less than 30% RPD, indicating high overall precision.

Quantitation:

No significant problems were encountered. All sample results and reporting limits for soils were corrected for percent moisture as required.

For initial calibration the percent relative standard deviations were less than or equal to 30% for all compounds. Average relative response factors (RRF) for all volatile target compounds and system monitoring compounds were within validation criteria. For continuing calibration all of the

percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25%, except for acetone in 2 CCVs and chloroethane and bromomethane in one CCV.

Method SW8310 Polynuclear Aromatic Hydrocarbons by HPLC

Method Blanks / Equipment Blanks:

No investigated samples were impacted by the rinsate blank phenanthrene result (0.05ug/L).

Surrogate Recovery:

SDG 147008

The following samples that will be discussed below involve the surrogate 1-methylnaphthalene.

For sample EFB-AST637-SB5-GWRE all analytes are non-detect, 2 out of 2 surrogate recoveries were outside of QC limits with a low bias. The reanalysis EFB-AST637-SB5-GWRE confirmed the original results. Therefore, there are potential false negatives at the reporting limit.

The LCS and water blank were outside QC limits, a reanalysis was performed and was within criteria. For soil sample EFB-FDSC1-SB1-6 surrogates were diluted out and no data was qualified.

SDG 147505

For samples UST-699-CS-3 and UST-699-CS-2, 1 out of 2 surrogate results were below QC limits for 1-methylnaphthalene with a low bias.

For sample UST-699-SB, 2 out of 2 surrogate results were below QC limits for 1-methylnaphthalene with a low bias.

For soil blank QC125128, 1 out of 2 surrogate results were below QC limits.

For water blank QC 12165, 2 out of 2 surrogate results were below QC limits, a re-extraction was performed and similar results were obtained.

For LCSD blank QC 125167, 2 out of 2 surrogate results were failed, a re-extraction was performed and similar results were obtained.

For UST-699-CS-2 MS/MSD, 1 out of 2 surrogate results were below QC limits.

SDG 147007

For sample EFB-AST637-SW1, 2 out of 2 surrogate results were below QC limits. The reanalysis of this sample EFB-AST637-SW1-RE, 1 out of the 2 surrogates was below QC limits.

For sample EFB-AST637-SW1-QC, 2 out of 2 surrogate results were below QC limits. The reanalysis for this sample EFB-AST637-SW1-QCRE confirmed the initial results.

For EFB-AST637-SW1 MS/MSD, 2 out of 2 surrogate results were below QC limits. The re-extraction EFB-AST637-SW1 MS-RE/MSD-RE, 1 out of 2 surrogate results were below QC limits.

SDG 147835

For samples EFB-UST699-CS2A MS and EFB-UST699-CS4, 2 out of 2 surrogate results were below QC limits.

For LCS blank QC 127233 and samples EFB-UST699-CS2A MSD and EFB-UST-699-CS4, 1 out of 2 surrogate results were below QC limits.

SDG 147111

For samples EFB-AST637-SB9-6, EFB-AST637-SB10-6, EFB-AST-637-SB6-10, and EFB-AST637-SB7-4, 2 out of 2 surrogate results were below QC limits.

MS/MSD:

SDG 147008

QC water sample for EFB-AST637-SB5-GW was the same as SDG 147007 QC sample for water (see below).

QC soil sample for EFB-FDSC1-SB1-6 was the same as SDG 146977 QC sample for soil (see below).

SDG 147505

For samples UST-699-SB and UST-699-RB, 23 spikes out of 32 were below QC limits and 2 out of 16 RPDs were outside QC limits.

SDG 147007

Sample EFB-AST637-SW-1, 30 out of 32 MS/MSDs were below QC limits and 7 out of 16 RPD's were outside QC limits.

Sample EFB-AST637-SW1-RE, 14 out of 32 MS/MSDs were below QC limits and 8 out of

16 RPDs were above QC limits.

A reanalysis to confirm the results of the re-extracted MS/MSD was not performed.

SDG 147835

For sample EFB-UST699-CS2A, 17 out of 32 MS/MSDs were below QC limits and all RPDs were within QC limits.

For sample EFB-AST637-SB6, 25 out of 26 MS/MSD spikes were below QC limits all RPDs were within QC limits.

LCS:

SDG 147008

The water LCS, QC122611 was reported in SDG 147007 (see below).

The soil LCS, QC123036, 3 out of 16 analytes were out of QC limits for analytes; anthracene, benzo(a)pyrene, and benzo(g,h,i)perylene. The results for sample EFB-FDSC1-SB1-6 for these three compounds are biased low or false negatives.

For sample EFB-AST637-SB5-GW reporting limits for the 6 compounds; naphthalene, acenaphthene, anthracene, fluoranthene, chrysene, benzo(g,h,i)perylene, all non-detects are considered estimated and may be false negatives.

SDG 147505

For samples UST-699-SB and UST-699-RB, 31 LCS and LCSD results out of 32 were below QC limits with as low bias and all RPD were within the QC limits. For the re-extraction of these two samples, 12 spikes LCS out of 16 were below QC limits; for analytes naphthalene, acenaphthylene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, dibenz(a,h)anthracene, benzo(g,h,i)perylene, and ideno(1,2,3-cd)pyrene all RPDs were within QC limits, these 12 compounds are biased low or false negatives.

SDG 147007

For samples EFB-AST637-SW1 and EFB-AST637-SW1-QC, 6 spikes out of 16 were recovered low for analytes; naphthalene, acenaphthene, anthracene, fluoranthene, chrysene, benzo(g,h,i)perylene., these 6 compounds are biased low or false negatives.

SDG 147835

For QC sample associated with samples EFB-UST699-CS4 and EFB-UST699-CS2A, 8 spikes out of 16 were below QC limits for analytes; naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, benzo(k)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, and ideno(1,2,3-cd)pyrene, these 9 compounds are biased low or false negatives.

SDG 146977

For sample EFB-AST637-SB6-QC, 4 spikes out of 32 are below QC limits for analytes; anthracene, benzo(a)pyrene, benzo(g,h,i)perylene.

For sample EFB-EB-1, 6 spikes out of 16 were below QC limits for analytes; naphthalene, acenaphthylene, anthracene, fluoranthene, chrysene, benzo(g,h,i)perylene.

For samples EFB-AST637-SB8-6.5, EFB-AST637-SB9-6, EFB-AST637-SB10-6, EFB-AST637-SB6-10, EFB-AST637-SB7-4, and EFB-AST637-SB6, 3 spikes out of 16 were below QC limits for analytes; anthracene, benzo(a)pyrene, benzo(g,h,i)perylene.

Field Duplicate:

For samples EFB-ST637-SB6 and EFB-AST637-SB6-QC it was found that the RPD for fluorene, phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, and benzo(b)fluoranthene were above 50% RPD.

Quantitation:

PAH results for the following samples; EFB0AST637-SB5-GWRE, EFB-AST637-SW1-RE, UST-699-SBRE, EFB-AST637-SW1-QCRE, UST-699-RBRE, EFB-EB-1-RE could potentially be biased low or considered false negatives. However, the action levels for soil are approximately 3 orders of magnitude greater than the concentrations, therefore, a low bias would not effect the decision. The water PAH results are also biased low and slightly exceed the screening level without correction for this bias. It should also be noted that the benzo(a)pyrene reporting limit was approximately twice the groundwater screening level and was not detected at the reporting limit.

Methods SW6010B - Lead

Method Blanks / Equipment Blanks:

No lead concentrations were found above the reporting limit in the initial, continuing and preparation blanks.

MS/SD:

For sample UST-699-CS-2 lead was below recovery limits for the MS only and RPD was within criteria. This sample was re analyzed as UST-699-CS-2RE for lead, which was below the recovery limits for both MS and MSDs, the RPD was high. Lead results for UST-699-CS-X¹ samples are potentially biased low.

LCS:

For all samples LCS was within criteria for project.

Field Duplicates:

Samples EFB-FDSC10-SB1-QC and EFB-FDSC10-SB1-3 were identified as field duplicates. No lead was detected in any of the samples.

1. X is the symbol used for the extending letters and numbers after UST-699-CS.

3.0 RESTRICTION ON USE OF DATA

For VOC samples low level m,p-xylene detections in water should be considered false positives, from external sources. Please note other random issues were noted throughout the text.

PAH results in general should be considered biased low due to out of control analytical methods and holding time issues for water and soil samples.

There is a potential for lead to be biased low due to matrix interference for all UST-699-X¹ samples.

4.0 DATA ASSESSMENT SUMMARY

The overall representativeness and completeness of this sampling event and analytical effort is judged to be acceptable based on the evaluation of field data, laboratory QC data, and QA split sample data. Therefore, taking into consideration any qualifications stated in the text above, the quality of the analytical data for associated project samples should be considered acceptable for engineering decisions and disposal actions. It should be noted that although no data needed to be rejected, effects of low bias on selected PAH analytes and lead data, as noted on Section 3.0 of this report, should be considered when data is used for site decisions.

1. X is the symbol used for the extending letters and numbers after UST-699-CS.

5.0 REFERENCES

“National Functional Guidelines for Organic Data Review”, USEPA Contract Laboratory Program, February 1994.

“National Functional Guidelines for Inorganic Data Review”, USEPA Contract Laboratory Program, February 1994.

“Test Methods for Evaluating Solid Waste”, USEPA SW-846, Third Edition, Revision 1, Update III, December 1996.

“Quality Assurance Project Plan” – East Fort Baker, Marin County, California September 2000.

“BRAC SI FSP Addendum, East Fort Baker, Petroleum Sites Program”, August 2000.

APPENDIX G

SITE SUMMARY SPREADSHEETS

Site Summary Form

04-Jun-01

Site: Wharf Tank

RB File No.: 11

LBJ

County: 21

Address 659 Sommerville Rd.

Nearest Surface Water: Horseshoe Bay

Distance to SW (ft.): 50

Potential Ecological Risk: No threat to ecological receptors

Water Wells Affected?: No Distance to Wells (ft): 3770

Groundwater Benef. Use: Discharge to Bay

Pit Samples Submitted?: No

No. Borings: 0

No. Wells: 1

Ground Elev. (ft.): 11

Future Land Use: Recreational

Current Land Use: Military Base

Highest GW Depth (ft): 10

Lowest GW Depth(ft): 10

Direction of GW Flow: Unknown

Staff Notes:

Human Health Risk: No threat to human health, see PSMP.

Geology: Lean clay with gravel

Comments: This site was sampled to see if a former leaking tank was affecting the BRAC property groundwater.

Management Rqmts: None

Reports: Underground Storage Tank Removal Report, January 1998.

Petroleum Sites Management Plan, November 2000.

Closure Report, Petroleum Sites Program, June 2001.

Remedial Activity

Action Taken

Amount

Free Product: NA

Soil: NA

Ground Water: NA

Vapor: NA

Groundwater Results, ppb

DATE	LOCATION	TPH-G	TPH-D	BENZENE	TOLUENE	XYLENE	ETHYLBENZE	MTBE	HVOC	OTHERS	GW DEPTH
8/16/00	Between building	659	nd	NA	0.1	nd	0.07	nd	NA	NA	10

Soil Results, ppm

LOCATION	TPH-gas		TPH-diesel		Benzene		Toluene		Xylene		Ethyl-benzene		MtBE		Other	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
NA	NA		NA		NA		NA		NA		NA		NA			

Tank Information

TANKNO	TANKSIZE	TANKCONTENTS	TANKACTION	TANKDATE	LATITUDE	LONGITUDE
WT		NA Gasoline	Removed	08/16/2000	37.834	122.475

Site Summary Form

04-Jun-01

Site: FDS C-1

RB File No.: 9

LBJ

County: 21

Address Murray Circle

Nearest Surface Water: Horseshoe Bay

Distance to SW (ft.): 300

Potential Ecological Risk: No threat to ecological receptors, see PSMP

Water Wells Affected?: No Distance to Wells (ft): 2900

Groundwater Benef. Use: Discharge to Bay

Pit Samples Submitted?: No

No. Borings: 1

No. Wells: 0

Ground Elev. (ft.): 15

Future Land Use: Recreational

Current Land Use: Military Base

Highest GW Depth (ft): >6'

Lowest GW Depth(ft): >6'

Direction of GW Flow: Unknown

Staff Notes:

Human Health Risk: No threat to human health, see PSMP.

Geology:

Comments: This site is not a tank site. This is where the former fuel distribution system leaked.

Management Rqmts: None.

Reports: Fuel Distribution System (FDS) Pipeline Removal Report, January 1998.
Petroleum Sites Management Plan, November 2000.
Closure Report, Petroleum Sites Program, June 2001.

Remedial Activity

<u>Action Taken</u>		<u>Amount</u>
<u>Free Product:</u>	NA	NA
<u>Soil:</u>	NA	NA
<u>Ground Water:</u>	NA	NA
<u>Vapor:</u>	NA	NA

Groundwater Results, ppb

DATE	LOCATION	TPH-G	TPH-D	BENZENE	TOLUENE	XYLENE	ETHYLBENZE	MTBE	HVOC	OTHERS	GW DEPTH
8/9/00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>6'

Soil Results, ppm

LOCATION	TPH-gas		TPH-diesel		Benzene		Toluene		Xylene		Ethyl-benzene		MTBE		Other	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Northwest of Buildi	NA		7800		NA		NA		NA		NA		NA		1.5	
																PAH samples we

Tank Information

TANKNO	TANKSIZE	TANKCONTENTS	TANKACTION	TANKDATE	LATITUDE	LONGITUD
C1		NA Boiler Fuel	Removed		37.834	122.479

Site Summary Form

04-Jun-01

Site: FDS C-10

RB File No.: 10

LBJ

County: 21

Address 636 McReynolds Rd.

Nearest Surface Water: Horseshoe Bay

Distance to SW (ft.): 1200

Potential Ecological Risk: No threat to ecological receptors, see PSMP.

Water Wells Affected?: No Distance to Wells (ft): 2640

Groundwater Benef. Use: Discharge to Bay

Pit Samples Submitted?: No

No. Borings: 2

No. Wells: 0

Ground Elev. (ft.): 35

Future Land Use: Residential

Current Land Use: Military Base

Highest GW Depth (ft): >4'

Lowest GW Depth(ft): >4'

Direction of GW Flow: Unknown

Staff Notes:

Human Health Risk: No threat to human health, see PSMP.

Geology:

Comments: This is not a tank site. This is a place where the former fuel distribution system leaked.

Management Rqmts: Notify construction workers of residual contamination.

Reports: Fuel Distribution System (FDS) Pipeline Removal Report, January 1998.
Petroleum Sites Management Plan, November 2000.
Closure Report, Petroleum Sites Program, June 2001.

Remedial Activity

<u>Action Taken</u>		<u>Amount</u>
<u>Free Product:</u> NA		NA
<u>Soil:</u> NA		NA
<u>Ground Water:</u> NA		NA
<u>Vapor:</u> NA		NA

Groundwater Results, ppb

DATE	LOCATION	TPH-G	TPH-D	BENZENE	TOLUENE	XYLENE	ETHYLBENZENE	MTBE	HVOC	OTHERS	GW DEPTH
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>4'

Soil Results, ppm

LOCATION	TPH-gas		TPH-diesel		Benzene		Toluene		Xylene		Ethyl-benzene		MtBE		Other	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Behind Building 63	1.9		6800		nd		nd		0.016		0.0043		nd			Highest results ar

Tank Information

TANKNO	TANKSIZE	TANKCONTENTS	TANKACTION	TANKDATE	LATITUDE	LONGITUDE
C10		NA Boiler Fuel	Removed	08/16/2000	37.837	122.478

Site Summary Form

04-Jun-01

Site: Building 699

RB File No.: 6

LBJ

County: 21

Address 699 Sommerville Road

Nearest Surface Water: Horseshoe Bay

Distance to SW (ft.): 50

Potential Ecological Risk: No threat to ecological receptors, see PSMP

Water Wells Affected?: No Distance to Wells (ft): 3775

Groundwater Benef. Use: Discharge to Bay

Pit Samples Submitted?: Yes

No. Borings: 0

No. Wells: 0

Ground Elev. (ft.): 10

Future Land Use: Recreational

Current Land Use: Military Base

Highest GW Depth (ft): >4.5'

Lowest GW Depth(ft): >4.5'

Direction of GW Flow: Unknown

Staff Notes:

Human Health Risk: No threat to human health, see PSMP.

Geology: Lean clay or lean clay with gravel

Comments: One UST was removed in September 2000. No contamination was left in place following closure.

Management Rqmts: None

Reports: Closure Report, Petroleum Sites Program, June 2001

Remedial Activity

Action Taken

Amount

Free Product: recycle

20 gal

Soil: disposal

4 cy

Ground Water: NA

NA

Vapor: NA

NA

Groundwater Results, ppb

DATE	LOCATION	TPH-G	TPH-D	BENZENE	TOLUENE	XYLENE	ETHYLBENZE	MTBE	HVOC	OTHERS	GW DEPTH
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>4.5'

Soil Results, ppm

LOCATION	TPH-gas		TPH-diesel		Benzene		Toluene		Xylene		Ethyl-benzene		MtBE		Other	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Two samples take	nd		110		nd		nd		nd		nd		nd		0.21	
															0.0038	Overexcavation

Tank Information

TANKNO	TANKSIZE	TANKCONTENTS	TANKACTION	TANKDATE	LATITUDE	LONGITUDE
699	20 gal	Diesel	Removed	09/11/2000	37.834	122.47396

Site Summary Form

04-Jun-01

Site: Building 637

RB File No.: 7

LBJ

County: 21

Address 637 Breitung Rd

Nearest Surface Water: Horseshoe Bay

Distance to SW (ft.): 550

Potential Ecological Risk: No threat to ecological receptors, see PSMP

Water Wells Affected?: No Distance to Wells (ft): 3500

Groundwater Benef. Use: Discharge to Bay

Pit Samples Submitted?: Yes

No. Borings: 4

No. Wells: 1

Ground Elev. (ft.): 16

Future Land Use: Recreational

Current Land Use: Military Base

Highest GW Depth (ft): 4.5'

Lowest GW Depth(ft): 5.7'

Direction of GW Flow: Unknown

Staff Notes:

Human Health Risk: No threat to recreational receptor. Construction/Excavation worker should be notified of residual contamination.

Geology: Interbedded layers of lean clay, lean clay with sand, and clayey sand with gravel of varying thicknesses.

Comments: One AST was removed and replaced. Contaminated soil was removed and disposed.

Management Rqmts: Notify construction workers of potential residual contamination.

Reports: Environmental Baseline Survey, March 1997.

Comprehensive SI Work Plan, September 1997.

Comprehensive SI, February 1999.

Petroleum Sites Management Plan, November 2000.

Closure Report, Petroleum Sites Program, June 2001.

Remedial Activity

Action Taken

Amount

Free Product: Removal

250 gal

Soil: disposal

40 tons

Ground Water: NA

NA

Vapor: NA

NA

Groundwater Results, ppb

DATE	LOCATION	TPH-G	TPH-D	BENZENE	TOLUENE	XYLENE	ETHYLBENZE	MTBE	HVOC	OTHERS	GW DEPTH
08/09/00	Lat:37 50'06.4"N/Long: NA	NA	nd	NA	NA	NA	NA	NA	NA		5.7'

Soil Results, ppm

LOCATION	TPH-gas		TPH-diesel		Benzene		Toluene		Xylene		Ethyl-benzene		MtBE		Other	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Five confirmation s	NA		18000		NA		NA		NA		NA		NA			
																PAH samples we

Tank Information

TANKNO	TANKSIZE	TANKCONTENTS	TANKACTION	TANKDATE	LATITUDE	LONGITUDE
637	250 gal	Diesel	Removed	08/02/2000	37.838	122.4767

Site Summary Form

04-Jun-01

Site: Building 407

RB File No.: 12

LBJ

County: 21

Address 407 Murray Circle

Nearest Surface Water: Horseshoe Bay

Distance to SW (ft.): 650

Potential Ecological Risk: No threat to ecological receptors, see PSMP.

Water Wells Affected?: No Distance to Wells (ft): 2800

Groundwater Benef. Use: Discharge to Bay

Pit Samples Submitted?: No

No. Borings: 0

No. Wells: 0

Ground Elev. (ft.): 35

Future Land Use: Recreational

Current Land Use: Military Base

Highest GW Depth (ft): Unknown

Lowest GW Depth(ft): Unknown

Direction of GW Flow: Unknown

Staff Notes:

Human Health Risk: No threat to human health, see PSMP.

Geology: NA

Comments: This is an indoor AST.

Management Rqmts: None

Reports: Petroleum Sites Management Plan, November 2000.
Closure Report, Petroleum Sites Program, June 2001.

Remedial Activity

<u>Action Taken</u>		<u>Amount</u>
<u>Free Product:</u> other		20 gal
<u>Soil:</u> NA		NA
<u>Ground Water:</u> NA		NA
<u>Vapor:</u> NA		NA

Groundwater Results, ppb

DATE	LOCATION	TPH-G	TPH-D	BENZENE	TOLUENE	XYLENE	ETHYLBENZE	MTBE	HVOC	OTHERS	GW DEPTH
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Soil Results, ppm

LOCATION	TPH-gas		TPH-diesel		Benzene		Toluene		Xylene		Ethyl-benzene		MTBE		Other	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Inside Building 407	NA		NA		NA		NA		NA		NA		NA			No soil samples

Tank Information

TANKNO	TANKSIZE	TANKCONTENTS	TANKACTION	TANKDATE	LATITUDE	LONGITUD
407	20	Lubricating Oil	Closed in-place	11/27/2000		0

APPENDIX H

Memorandum to FUDS Program Manager

MEMORANDUM FOR Programs and Project Management Division, FUDS Program Manager (Gerald Vincent).

SUBJECT: East Fort Baker, FUDS Property petroleum contamination

1. A groundwater sample was collected on the BRAC portion of East Fort Baker to determine if the contamination left in place from the FUDS UST removal in 1997 by RCI had impacted groundwater and was reaching the BRAC property. The discreet groundwater sampler was pushed to 15 feet below ground surface (bgs) at the location shown on the attached map. Water was detected at 10 feet bgs. Gasoline and BTEX/MTBE samples were collected at this point. Due to lack of yield, samples were not collected for Diesel or PAHs. No detections above developed screening levels for the East Fort Baker BRAC property were found, see attached table of results.
2. Due to the subsurface conditions at East Fort Baker, it is recommended that if any additional groundwater investigations are performed, a temporary monitoring well be used instead of discreet samplers. If you have any additional questions, feel free to contact me at extension 7257.

MEEGAN G. NAGY
Environmental Engineer
Environmental Design Section

Enclosures

Analytical Results for Groundwater at Wharf Tanks Well

Wharf Tanks		Location	SB1
		Depth (ft.)	GW
Analyte Names	Reporting Limit	Groundwater Screening Level	
EPA Test Method 8260 (all units are ug/L)			
Benzene	0.5	71	nd
Toluene	0.5	5,000	0.1 J
Ethylbenzene	0.5	86	0.07 J
Total Xylenes	0.5	2,200	nd
MTBE	0.5	8,000	nd
EPA Test Method 8310 (all units are ug/L)			
PAHs			NA
DHS Test Method 8015-Modified (all units are ug/L)			
TPH (Gasoline C7 - C12)	50	3,700	nd
TPH (Diesel C10 - C24)		640	NA
TPH (Motor Oil C24 - C36)		640	NA
EPA Test Method 6010B (all units are ug/L)			
Lead		8.1	NA

Legend:

nd = not detected

n/a = not analyzed

TPH = Total Petroleum Hydrocarbon

Data Qualifiers:

J = estimated value

Y = fuel unlike diesel

H = heavier hydrocarbons contributed to the quantitation

L = lighter hydrocarbons contributed to the quantitation

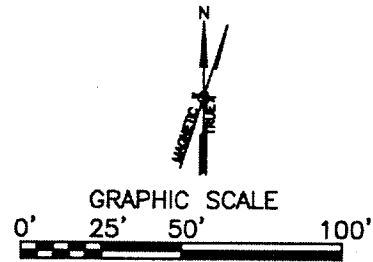
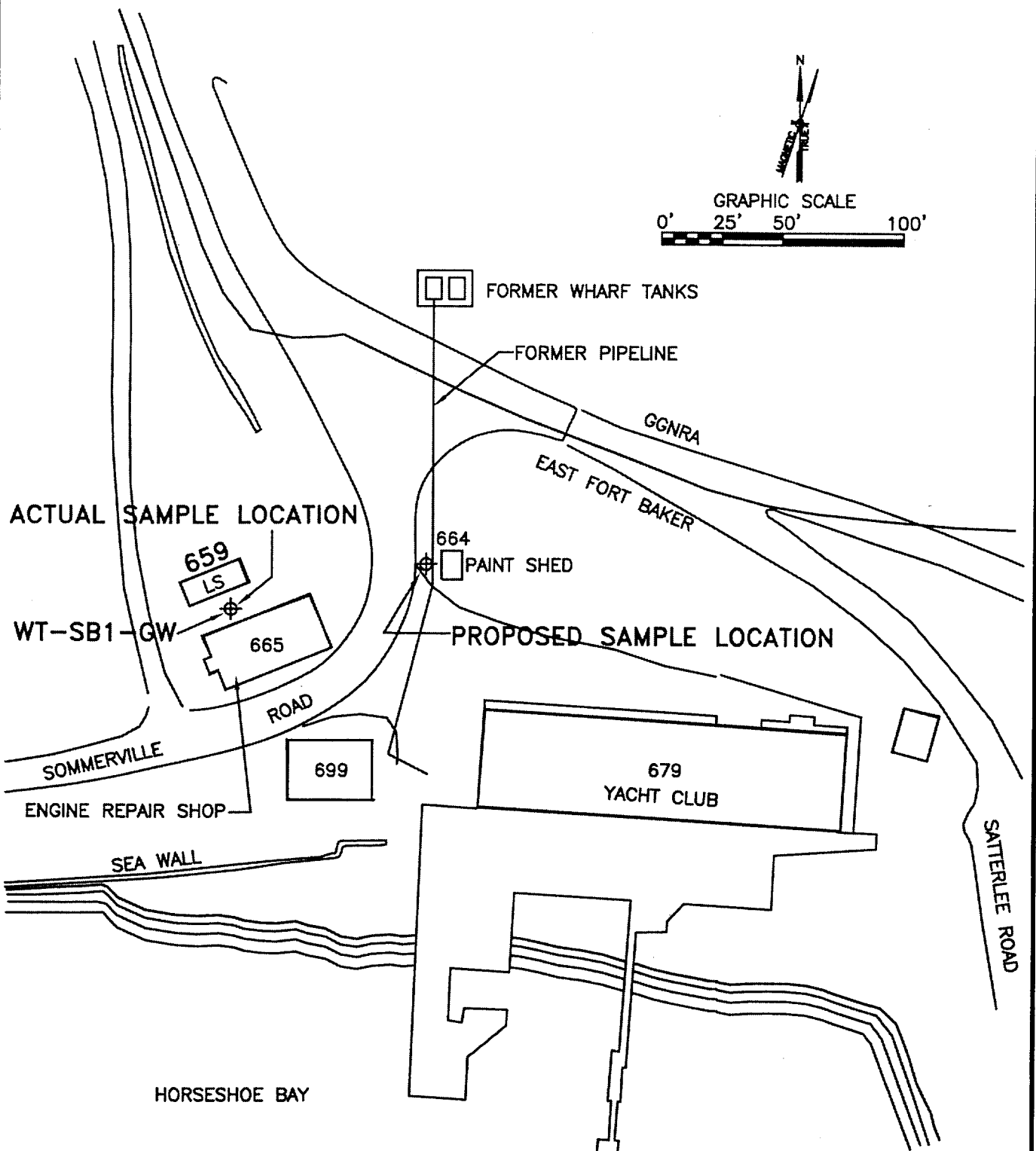
R = rejected

Z= unknown single peak(s)

Notes:

1. Shaded result indicates that the value exceeds the applicable screening level.
2. Diesel/Motor Oil, Lead and PAHs were not sampled because of a lack of yield from the well.

G:\EDPUBLIC\ENVIRONMENTAL\EDS\PROJECTS\M-CALIE\E637MG13.DWG, 03/07/01, 1:1,(1/50XP)
G:\EDPUBLIC\ENVIRONMENTAL\EDS\PROJECTS\M-CALIE\E637MG05.DWG, 06/05/00, 1:1,(1/50XP)



LEGEND:

- GROUNDWATER SAMPLE LOCATION
- BRAC PROPERTY LINE
- LIFT STATION

NOTE:
THE PROPOSED GROUNDWATER LOCATION WAS
ABANDONED DUE TO REACHING BEDROCK PRIOR
TO GROUNDWATER.



DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT,
CORPS OF ENGINEERS
JUNE 2001

EAST FORT BAKER

MARIN COUNTY,
CALIFORNIA

PETROLEUM SITES PROGRAM CLOSURE REPORT
WHARF TANKS SAMPLING
LOCATION MAP

SCALE:

1" = 50'

FIGURE:

2-1

APPENDIX I

Benzo(a)pyrene Equivalent Calculations

Benzo(a)pyrene Equivalent Calculations

Below are the calculations for the benzo(a)pyrene equivalents (B(a)Peq). The equivalency factors used were those shown in the Petroleum Sites Management Plan, page 2-16.

Benzo(a)pyrene = 1

Benzo(b)fluoranthene = 0.1

Benzo(k)fluoranthene = 0.1

Benzo(a)anthracene = 0.1

Chrysene = 0.01

The calculations are shown in order of constituents listed above. All zeros are non-detect.

Site 637:

SB6 - $(0*1) + (0*0.1) + (0*0.1) + (0.023*0.1) + (0.16*0.01) = 0.0039 \text{ mg/kg}$

SB7 - $(0*1) + (0*0.1) + (0*0.1) + (0.54*0.1) + (3.5*0.01) = 0.089 \text{ mg/kg}$

SB8 - $(0.044*1) + (0.041*0.1) + (0*0.1) + (0*0.1) + (0.044*0.01) = 0.049 \text{ mg/kg}$

SB9 - $(0*1) + (0.38*0.1) + (0*0.1) + (0.032*0.1) + (0.19*0.01) = 0.043 \text{ mg/kg}$

SB10 - $(0*1) + (0.1*0.1) + (0*0.1) + (0*0.1) + (0.067*0.01) = 0.011 \text{ mg/kg}$

Site 699:

CS1 - $(0.0077*1) + (0.013*0.1) + (0.0055*0.1) + (0.018*0.1) + (0.02*0.01) = 0.012 \text{ mg/kg}$

CS2A - $(0.0038*1) + (0*0.1) + (0.0027*0.1) + (0.0037*0.1) + (0.0058*0.01) = 0.004 \text{ mg/kg}$

Site C-1:

SB1 - $(0*1) + (1.5*0.1) + (0.43*0.1) + (0*0.1) + (0*0.01) = 0.193 \text{ mg/kg}$

APPENDIX J

Response to Comments

Comments and Responses on Draft Petroleum Sites Closure Report

#	REFERENCE	COMMENT	RESPONSE
COMMENTS – SFBRWQCB (Brad Job)			
1.	General	No comments.	
COMMENTS – NPS			
2.	General	<p><u>Residential Use Action Level Multiplier:</u> The NPS disagrees with the modification of residential screening levels using an action level multiplier (also called an area use factor), which in the Closure Report is equal to the residential parcel size divided by the area of impacted soil remaining at the site. Our primary objection to the use of action level multipliers is they assume that exposure is uniformly distributed across an assumed residential exposure area, which the Closure Report sets at 0.25 acres. This assumption does not account for a potential future use scenario of children who play predominantly in the impacted area.</p> <p>In addition, the actual areal extent of impacted soil is unknown for these sites. For each site, the value used to represent the areal extent of impacted soil in the Closure Report is approximately equal to the area of excavation. However, the excavations were backfilled with clean fill and thus are not representative of the areal extent of impacted soil remaining onsite. The actual area of impacted soil extends from the excavation walls outwards an unknown distance. A substantial amount of additional sampling would be required to determine how far away from the excavations impacted soil actually extends.</p> <p>Finally, the use of an action level multiplier has the potential to generate excessively high soil screening levels which would allow “hot spots” of contamination to remain. For example, the residential soil screening value obtained for fuel oil at the Fuel Distribution System (“FDS”) C-1 site (see Table 2-4 of the Closure Report) is calculated as 59,375 milligrams per kilogram, which is approximately 6% of the soil composition, a concentration which would clearly be indicative of a “hot spot”.</p> <p>The NPS requests that action level multipliers not be used to adjust residential screening levels.</p>	<p>As described in section 2.3.5 Residential Receptor in the Petroleum Sites Management Plan, the use of multipliers (area use factors) is appropriate unless the constituent is a VOC. The use of a multiplier will be removed for gasoline, BTEX and MTBE. Tables 2-2 & 2-4 will be modified. The development of the multiplier (area use factor) took into account a typical parcel size of 0.25 acres, which is smaller than the actual average parcel size at East Fort Baker, 0.3 acres. In addition, a majority of the FDS is predominantly under the historic roadway and not in play areas.</p> <p>The sites along the entire FDS in the historic housing area have been remediated to below petroleum hydrocarbon action levels with the exception of the residual petroleum contamination in the C-10 area. It is highly unlikely that PAHs would extend beyond the excavation walls if the fuel did not. Therefore, the assumption of a 3 feet by 110 feet area of assumed PAH contamination is a conservative assumption and there will be no change to the contamination assumption in the Closure Report as written.</p> <p>As stated in the report, since the residential receptor is not the most sensitive, the recreational or construction/excavation worker action levels would be used as the most restrictive action levels when the residential multiplier is applied. This process ensures that no unacceptable risk is left behind. Text will not be modified.</p> <p>In addition, the following rationale is provided:</p> <ol style="list-style-type: none"> 1. During the development of the Petroleum Sites Management Plan (PSMP), the issue of a multiplier for

Comments and Responses on Draft Petroleum Sites Closure Report

#	REFERENCE	COMMENT	RESPONSE
			<p>the residential receptor was discussed. The following comment was included in the 18 May 2000 letter from Brad Job of the Regional Water Quality Control Board. "Regional Board staff are aware of other sites where residential exposure has been averaged using a relevant lot size as the basis. Given the overall lack of volatile organic chemicals (VOCs), Regional Board staff does not object to this approach. In the event that VOCs are detected near or underlying residential lots, then this approach may not be protective and must be evaluated." The Army response is, "The text, as currently included in the PSMP, will remain. A statement will be added to indicate that further evaluation will be conducted if VOCs are detected." This comment and response are included in Appendix D, Response to Comments in the Final Petroleum Sites Management Plan, November 2000.</p> <p>2. US Environmental Protection Agency Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A) Interim Final, December 1989 indicates that the use of averaging soil data over an area the size of a residential backyard may be most appropriate for evaluating residential soil pathways. (Section 6.5.3 Estimate exposure concentrations in soil)</p> <p>3. US Army Corps of Engineers Risk Assessment Handbook, Volume I: Human Health Evaluation, 31 January 1999. A distribution analysis of the chemical presence at the site should be conducted. This examination would differentiate between impacted areas and nonimpacted areas which is particularly useful at very large sites. The distributional analysis can be a statistical evaluation or performed qualitatively. (Section 4.3.2, General Considerations)</p> <p>4. East Fort Baker underwent an independent technical review of in 1999. Although petroleum sites</p>

Comments and Responses on Draft Petroleum Sites Closure Report

#	REFERENCE	COMMENT	RESPONSE
			<p>were not specifically evaluated, the following recommendation was provided for the upland removal action sites. East Fort Baker, the Independent Technical Review Team (ITRT). "Site-specific PRGs should be developed for each receptor population for the future use of the facility, including 1) grounds workers, 2) child and youth recreational users, 3) residential (for specifically defined areas of the facility), and 4) occupational (at the boat dock). Each receptor population's activities are limited to specific facility areas, depending on the projected land use and activity patterns. For example, the residential scenario should be limited to ¼ acre areas adjacent to the residential housing area. ... Receptor and site specific activity patterns that result in larger or smaller exposure areas require documentation." Although this approach was not taken for the removal action sites, this recommendation was used for the petroleum sites.</p> <p>The use of action level multipliers (area use factors) will remain with the exception of gasoline, BTEX, and MTBE.</p>
3.	General	<p><u>B(a)P Equivalents:</u> From the tables in the Closure Report, it is unclear how benzo(a)pyrene ("B(a)P") equivalents will be used with regard to the screening levels of total carcinogenic polynuclear aromatic hydrocarbons ("PAHs"). Please clarify (e.g., by adding a note to the tables) the use and meaning of the B(a)P equivalents. As presented in our letter, dated August 2, 2000, weighted totals of carcinogenic PAHs (where each PAH concentration is weighted using its carcinogenicity relative to B(a)P and the weighted concentrations are then summed) should be calculated and compared with the appropriate B(a)P action levels.</p>	<p>The value of the B(a)P_{eq} will be added in parentheses next to the term B(a)P_{eq} in each receptor column. The most restrictive will then be shown in the most restrictive columns. The B(a)P equivalents have been calculated and are in the text of the document. These values will be added to the appropriate tables for clarity. A section will be added which summarizes the text of the Petroleum Sites Management Plan in relation to B(a)P_{eq}.</p>

Comments and Responses on Draft Petroleum Sites Closure Report

#	REFERENCE	COMMENT	RESPONSE
4.	Specific	<u>Wharf Tanks</u> : The Closure Report recommends no further action for the Wharf Tanks. As stated in our letter dated March 8, 2001, the NPS requests that the United States Army provide the NPS with a status update and obtain regulatory closure for all East Fort Baker Formerly Used Defense Sites, including the Wharf Tanks.	<p>All issues related to Formerly Used Defense Sites (FUDS) should be addressed to Gerald Vincent, FUDS Program Manager. This report will address BRAC issues only. Mr. Vincent has been informed of sample results from this effort (see appendix H of the report).</p> <p>Gerald Vincent's address is: U.S. Army Corps of Engineers Attn: CESPK-PM-H (Gerald Vincent) 1325 J Street Sacramento, CA 95814-2922</p>
5.	Specific	<u>Appendix G, Site Summary Form</u> : The Site Summary Form for the FDS C-10 site included in Appendix G misidentifies the future land use for this site as recreational. Please change this form to reflect the fact that the future land use at this site is residential.	Site Summary sheet will be modified.